

# MARINE REVIEW.

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## Combinations in the Iron Ore and Vessel Business.

A feeling of discontent and complaint on account of big combinations in the iron ore and vessel business has certainly manifested itself among vessel owners on the lakes since John D. Rockefeller has been acquiring large interests in mines, ships, docks and railways. There is no denying this fact, and there are some people who are predicting a very uncomfortable state of affairs in the future, on account of it. They refer to the part taken by the vessel interests as a whole in bringing about improvements of channels and in upholding legislation favorable to the iron industry, and they complain of a state of affairs which is forcing the business into a few hands.

It is probable, however, that the business arrangements made recently between Mr. Rockefeller and the Carnegie company have been over-estimated in so far as these particular transactions relate to the interests of other vessel owners. Although the Carnegie company, through its recent dealings with Mr. Rockefeller, has secured itself in a position unequalled by any steel producer in the world, this does not mean that the Rockefeller interest in ships is to be materially enlarged over what it was a year ago. If the Rockefeller ships are to carry Carnegie ore, a place has been made for other vessel property to move the tonnage on which these ships would otherwise be engaged. But a greater argument that is held up to offset the oppositions to combinations is a claim that a cheapening of iron products must result in an immense increase in business, both in the additional use of iron and steel in this country and in a big export business to which low prices must eventually lead.

## Ship Yard Matters.

Although it is understood that Mr. Lewis H. Hall of New York, who is interested in the Niagara Paper Co. and the pulp wood industry on the lakes, is to be the principal stockholder in the steel steamer for which Wheeler & Co. secured a contract a few days ago, the name of J. L. Crosthwaite, Buffalo, is given out by the West Bay City firm as the managing owner. Mr. Crosthwaite is, of course, largely interested in the new steamer and will have full charge of her. The correct dimensions are, 281 feet over all, 266 feet keel, 42 feet beam and 19 feet depth. Engines will be triple expansion with cylinders of 17, 28 and 47 inches diameter and a common stroke of 36 inches. There will be two Scotch boilers, 11 by 12 feet, capable of withstanding 170 pounds working pressure. The vessel will cost about \$120,000. Particulars of another new vessel are also at hand. The Calvin Co., forwarders of Garden Island, Ont., will build on their own account a wooden steam barge for the timber and grain trade. The vessel will be 215 feet over all, 200 feet keel, 37 feet beam and 15 feet depth of hold. She will have triple expansion engines, of 16, 24 and 36 inches cylinder diameters and 24 inches stroke. Two boilers of Scotch type will be of 12 feet 6 inches diameter and will be capable of withstanding 170 pounds steam pressure. Owners place the value of the vessel at \$80,000. Thomas Brian is foreman of the Calvin Co.'s ship yard and John Mullen is in charge of the engine works.

The town of Lorain, where the Johnson Steel Works are located, has an energetic improvement committee. This committee made a stir in Lorain a few days ago by talking of getting up a sum of money, with which it was proposed to induce the Cleveland Ship Building Co. to move its plant from Cleveland. It is not at all probable, however, that a change would result from any proposition that might be made from the Lorain people. Repair work is done in the principal lake ports, where dry docks are also located, and repairs to steel ships in Cleveland involve a large expenditure of money each year. This business, for various reasons, not least of which is the interest of owners in it, would not follow a ship building company that might locate in any of the smaller ports, even though big inducements might be offered for the construction of dry docks at such ports. The smaller places that are clamoring for dry docks do not seem to fully realize the importance of these conditions, which are against their plans. Officers of the Cleveland company may probably feel, in looking

to the future, that their present quarters will not admit of big development, but it would seem that there is nothing in sight that would induce them to go to Lorain.

It is expected that the oil barge, building at the works of the Union Dry Dock Co., Buffalo, for the Standard Oil Co., will be launched during the coming month. Among steel vessels in dock at Buffalo recently were the Northern King, America, Emily P. Weed and Onoko. Work on these vessels was not extensive, but plans for the winter involve an expenditure of about \$26,000 each on the New York and Rochester and about \$30,000 each on the Owego and Chemung. The usual winter repairs will also be made on the Tioga. Directors of the Union company have appropriated enough money to build a new dry dock. It will be large enough to receive a boat 500 feet long and 50 feet beam. Engineers are now at work on the plans. The present dock will be widened and deepened during the winter, so as to take in boats 350 feet long and 45 feet beam, and leave 5 feet of clear space on the keel blocks.

Neither the Chicago Ship Building Co. nor the Cleveland Ship Building Co. have as yet given out any information regarding plans for the quadruple expansion engines which they are to provide, in connection with Babcock & Wilcox water tube boilers, for the two big Wolvin freight steamers Crescent City and Empire City. Although these are the first quadruple engines to be fitted to freight steamers on the lakes, it is not probable that either of these companies will experience any difficulty in building them, as they have abundant precedent to follow in other lines, and anyhow the problem is not a difficult one. But the two companies are withholding details, which would seem to indicate that neither of them is disposed to let "the other fellow" know what is being done.

There is as yet nothing definite in the proposition to build another 400-foot steamer at the Wyandotte yard of the Detroit Dry Dock Co. Employes of the ship yard have prepared a petition to the company, which is now being signed, and in which the men suggest that the company go ahead with the building of a steamer on a plan of credit involving part of their pay. They propose that such of their number as have been receiving \$1.50 a day or less be paid weekly in full as heretofore, while those who are entitled to more than \$1.50 a day are to receive only that amount and allow the balance to stand with the company for six months, at 4 per cent. interest, or if the vessel is sold within the six months, a settlement of back pay to be made at the time of sale on the same basis.

Mr. John F. Pankhurst of the Globe Iron Works Co. has gone to California, having made arrangements before leaving that will permit of his giving up all business matters for some time to come. Mr. Pankhurst has been in poor health for a couple of years past and especially of late. The management of the works, both as regards machinery and ship yard, is in the hands of Mr. Newman, a naval architect who came to the Globe works from the yard of the Cramps, Philadelphia, some time ago. Mr. Allen, secretary of the company, will be assisted to an important extent by Mr. Ireland, the assistant secretary, who has of late taken up a large part of his office detail.

Robert Curr of Cleveland, who was, until a short time ago in charge of the Globe company's yard, goes to West Superior, Minn., Jan. 2, to superintend for Pickands, Mather & Co. the construction of the vessel that is to be built for the Inter-Lake Transit Co.

The American Steel Barge Co. is no longer interested in the Conneaut docks. In preparation for Mr. Carnegie's control of the ore business between Conneaut and Pittsburg, the barge company was offered \$80,000 for its \$50,000 interest in the docks. The bonus of \$30,000 was tempting and it was accepted.

The deputy minister of marine and fisheries at Ottawa, Can., will receive, until Jan. 20, tenders for removing the wreck of the steamer Grand Traverse, which lies sunk in the channel north of Colchester reef light-house, Lake Erie.



### A Big Item of Freight.

A big item of freight, to which very little attention is given when the entire volume of lake commerce is under consideration, is that of the Sturgeon bay and Lake Michigan ship canal, which is used as a short and direct route between Lake Michigan and such places as Marinette, Menominee and Pensaukee. Since the government has taken charge of this waterway correct figures regarding the commerce are available. During the year 1895 the freight passing to and from Lake Michigan through this canal aggregated 810,971 tons, of which 91,526 tons passed inward from Lake Michigan and 719,445 tons outward. The total number of passengers carried both ways was 10,989. Of this number 6,739 passed inward and 4,250 outward. The total estimated value of freight carried through the canal for the year is \$12,171,903.75. Lumber is the principal item and is estimated at \$5,803,200; general merchandise, \$4,627,912; salt, \$75,567.60; stone, \$64,090.80; fish, \$94,600.00; coal, \$103,754; railroad ties, \$32,780, and wood, \$51,220.

This is the route followed by the line of car ferry barges that are operated between Peshtigo and Chicago. It is evident that an important trade is gradually being built up in this part of the Lake Michigan district, and the commerce will increase as government funds are provided for improvement and maintenance of the canal. Among the items of freight that passed inward from Lake Michigan were 227 tons of agricultural implements, 850 tons of apples, 3,062 tons of brick, 28,539 tons of coal, 413 tons of fish, 6,989 tons of flour, 1,564 tons of corn, 162 tons of peas, 3,700 tons of hay, 5,719 tons of iron (manufactured), 30 tons of pig iron, 150 tons of lumber, 27,456 tons of general merchandise, 56 tons of paper, 12,594 tons of salt and 13 tons of sulphur.

The outward movement, which is by far the larger, comprised 7,934 tons of wheat, 1,925 tons of iron ore, 4,825 tons of pig iron, 6,000 tons of logs, 580,170 tons of lumber, 3,396 tons of general merchandise, 510 tons of paper, 24 tons of paving blocks, 545 tons of piles, 1,780 tons of telegraph poles, 1,763 tons of fence and paving posts, 584 tons of potatoes, 618 tons of shingles, 71,212 tons of building and crib stone, 2 tons of tea, 6,473 tons of railroad ties, 330 tons of trees, 25,600 tons of wood, 231 tons of bark, 75 tons of brush, 1,105 tons of coal, 248 tons of dairy products, 533 tons of fish, 2,379 tons of flour, 16 tons of corn, 16 tons of oats, 306 tons of peas, 638 tons of hay, 61 tons of hides, and 142 tons of manufactured iron.

### Erastus Wiman's Erie Canal Plans.

In endeavoring to secure privileges for dock and storage facilities in New York, Erastus Wiman, who is promoting the scheme to consolidate Erie canal boat interests, unfolded some of his plans to the New York dock board at a meeting held a few days ago. Mr. Wiman makes some claims as to freight charges, under his consolidation plan, that seem, to say the least, to be so low as to preclude any idea of profit. He informed the New York board that delays to canal boats in New York harbor last year amounted to eighty days out of the short season of 210 days and that made it impossible to compete successfully with rail traffic. The consequence was, he said, that the great flour export trade was diverted from New York. Mr. Wiman exhibited contracts from C. A. Pillsbury, E. B. Church, and many other millers, in which they agree to ship direct for export to New York, through the Consolidated Canal & Lake Co., all the way from 900 to 900,000 barrels of flour annually. He showed that but 900 barrels of flour had reached New York through the Erie canal last year as against 11,000,000 barrels to lower lake ports. The new company, he said, by such men as C. A. Pillsbury, B. C. Church, F. B. Underwood, E. A. Young, ex-Mayor Edson, J. A. Cormack, R. W. Clarkson and Samuel Hart behind it. He stated further that the company intends to build a large fleet of boats suitable for the lake trade and the enlarged Erie canal and agrees to carry freight direct from the center of the continent to New York. The rate of freight from Buffalo to New York, he says, will be 45 cents per ton, or one mill per ton per mile, and the charge of the storage and transfer to ocean vessels will not be more than 25 cents per ton. Mr. Wiman estimated that the company would eventually handle 10,000,000 barrels of flour annually for export. If the company in any year carries less than 100,000 tons of freight they agree to forfeit the lease of dock property which they are seeking.

Army and navy charts of the lakes are kept in stock by the Marine Review, Perry-Payne building.

### Chicago Drainage Canal.

An average of full 90 per cent. of the Chicago drainage canal work was completed on Nov. 1. Sixteen sections were on that date entirely completed and final vouchers rendered, and although there is a shortage of funds, it is asserted positively that the canal will be opened during the coming year. The shortage of funds will be overcome and the canal opened, it is claimed, by turning down from Lake Michigan a smaller flow of water than was originally intended. The main saving, according to charges made against the trustees in this regard, will be in curtailing the changes that were planned in Chicago river, so as to admit of a flow of 300,000 cubic feet per minute, and in modifying or abandoning altogether the plans for protecting the city of Joliet from overflow. Towns along the route of the canal in the Illinois valley are protesting against the evident intentions of the trustees to finish up the canal with an insufficient flow of water and without any thought of making it valuable for commerce. The deluded Illinois valley people have, of course, been alone in cherishing the hope that the canal would ever float vessels of any account. Everybody else has regarded it simply as a big sewer. It is an immense undertaking, however, and the magnitude of the work, now that it is nearing an end, may be realized from reports of what has been accomplished. The plans provided for removing in all 27,343,000 cubic yards of glacial drift and 12,305,000 cubic yards of rock. On Nov. 1 there had been excavated 23,880,000 cubic yards of glacial drift and 11,850,000 cubic yards of rock. Of retaining walls the total called for was 356,516 cubic yards, and 331,630 cubic yards was erected. The total value of contracts let was \$19,255,291, and of this contracts aggregating \$17,775,205 were completed.

### Upholding Capt. McDougall's Opinion.

Editor Marine Review:—I note in your issue of the 17th Capt. McDougall's statement relative to the disappointment of vessel owners and the United States engineers over the result of dredging to secure a 20-foot channel. If you will refer to your issues of 1893, you will find that it was then stated in my contributions to the Railroad Gazette and in reply to Gen. Poe in the Review, that the proposed 20-foot channel would not be realized. I think Capt. McDougall perfectly correct in his prediction that a low water season would give lots of trouble to owners of deep draft steamers. It is my opinion that a big mistake is being made in allowing the plan to deepen the waterways by regulating the lake surface near the high water plane to fail in congress. The Lake Carriers' Association will do well to give this matter careful consideration at their meeting next month and take timely action.

Geo. Y. Wisner.

Detroit, Mich., Dec. 19, 1896.

### Wants Information Regarding the Essex.

Editor Marine Review:—I am endeavoring to obtain as much information as it is possible to get at this late day regarding the schooner Essex, which was built in Cleveland a great many years ago for Joseph Wells by a shipwright whose name was Tylee. It occurred to me that a note in the Review might attract the attention of some of the older vessel men. I am specially desirous of learning one year in which this vessel was built. She was of about 200 tons.

14 Ironton Street, Cleveland.

Wm. A. Wells.

Sixteen of the vessels laid up in Buffalo are loaded with grain that is to be held indefinitely. They are as follows: Rappahannock, 98,000 bushels flax seed; Appomattox, 105,500 bushels flax seed; Granada, 95,300 bushels flax seed; Nyanza, 40,000 bushels wheat; G. W. Roby, 24,421 bushels barley, and 56,000 bushels wheat; V. H. Ketchum, 50,000 bushels wheat; Phenix, 81,550 bushels barley; G. F. Williams, 85,057 bushels wheat; T. Maytham, 110,000 bushels corn; H. A. Hawgood, 100,000 bushels oats; Progress, 68,500 bushels flax seed; J. C. Fitzpatrick, 87,500 bushels corn; C. B. Lockwood, 95,000 bushels rye, and 101,000 bushels wheat; George Spencer, 66,767 bushels flax seed. This is a total of 1,390,284 bushels, of which 559,756 bushels is flax seed, 332,057 bushels is wheat, 197,500 is corn, 165,971 is barley, 100,000 is oats and 95,000 is rye. Thus every description of grain is afloat in Buffalo with nearly half the whole amount flax seed.

Why not avail yourself of the opportunity of visiting friends while holiday rates are in effect via the Nickel Plate road. Tickets on sale Dec. 24, 25, 31, and Jan. 1, 1897. Return limit Jan. 4. 408 Dec. 31



### May be Made Effective Fighting Ships.

Officers of the revenue cutter service have now practically completed plans for the two new lake revenue cutters, which are to be similar to the Gresham, just finished in Cleveland, and which attained for a short run during her official trial a maximum speed of 18.25 knots, equal to 21.01 statute miles. It is plain now that when these vessels are completed the revenue cutter service will have on the lakes three steamers that will be susceptible of quick and easy conversion into effective fighting ships. It is certainly fitting that the work of improving this service should begin on the lakes, where there is about 6,000 miles of coast line—nearly equal to the whole length of the Atlantic seaboard. The regular armament in the new vessels, as in the Gresham, will consist of one 6-pound, rapid-fire gun mounted on the fore-castle deck; but in case of naval co-operation they are so designed and constructed that each may carry a main battery of six 4-inch, rapid-fire guns and an auxiliary force of eight or ten 6-pounder guns. So armed, they would prove valuable dispatch boats, block-aders or effective commerce destroyers; and in these steamers there is to be also, as in the Gresham, a bow torpedo tube, which can readily be fitted with the mechanism for handling and launching torpedoes.

Principal dimensions of the two new cutters are: Length over all, 205 feet 6 inches; length between perpendiculars, 188 feet; breadth of beam, extreme, molded, 32 feet; mean draft, 10 feet 9 inches; normal displacement, tons, '927; maximum indicated horse power, 2,000; speed in knots per hour, 16. The boats will be built of steel throughout, will be rigged as fore-and-aft schooners and will carry a spread of steady sail only.

Each vessel will have a single screw of manganese bronze, 10 feet in diameter, which will be driven by a vertical, direct-acting triple-expansion engine, having high, intermediate and low-pressure cylinders, respectively of 25, 37½ and 56½ inches diameter, with a uniform stroke of 30 inches, and a turning speed of 160 revolutions a minute when developing the required indicated horse power of 2,000 and inducing the contract speed of 16 knots. Steam at a working pressure of 160 pounds to the square inch will be supplied in each boat by four Scotch boilers of the return fire-tube type, in diameter 11½ feet by 10 feet long. Each boiler will have two 3½-foot Fox corrugated furnaces, and a structural peculiarity of the boilers will be in the use of but two steel plates in their longitudinal construction, by which added strength with a limited number of seams is secured. The boilers will be worked from a common fire-room and two large blowers, exhausting directly into the ash pits, will induce forced draught. By this means the pressure under each boiler will be under independent control, admitting of economical service when running at cruising speed.

The normal coal supply will be about 225 tons, promising a radius of action of 2,000 miles at a cruising speed of 10 knots an hour. Steam steering gear, steam windlass and capstan, an electric lighting plant and hydro-pneumatic ejector for ashes are other modern features to be provided in these vessels. There is, of course, ample room in which to provide quarters for a complement of about sixty persons aboard each of these vessels. The captain's quarters will consist of a forward and after cabin, two state rooms, two baths, four locker-seat berths, and an office. In the wardroom, on the berth deck, there will be eight comfortable state rooms, four locker-seat berths, two baths, a lounging room and a dining-room. Forward on the berth deck, there will be four staterooms, for the steerage officers, together with a mess, and ample space without for the accommodation of the crew.

January seems now to be the month fixed for conventions that are of special interest to the lakes. The Lake Carriers' Association will meet in Detroit, as usual, and it is quite probable that the dates will be Jan. 12 and 13. In Washington, later in the month, the United States board of supervising inspectors of steam vessels, the Ship Masters' Association and the National Association of Marine Engineers will all hold lengthy sessions.

In accordance with a custom of long standing, the Joseph Dixon Crucible Co., of Jersey City, N. J., has again sent out as a Christmas gift a varied and liberal supply of pencils to its newspaper friends. It is understood that no public notice of this gift is sought by the Jersey City company, but this is all the more a reason for acknowledgement of the favor, and anyhow good lead pencils are especially desirable in a newspaper office.

### Revenue Cutter Service in 1896.

Appropriations from the government for the construction of new revenue cutters have directed attention to the revenue cutter service. This service is now nearly 100 years old. The new vessels are badly needed. An officer of the service, referring to its operations during 1896, says:

"The record of the past year of the revenue cutter service, perhaps the most trying one in all the long years of its existence, is interesting not only because of the service actually performed while handicapped by vessels of wanting capabilities but because of the promise of what we should expect when properly equipped with ample modern craft. During the past fiscal year—ending June 30, 1896—this fleet of thirty-six vessels maintained an active patrol of the coast line, rivers and harbors of the United States upon the seas, the gulf, and the great lakes, and in the discharge of that work cruised an aggregate of 307,133 nautical miles; boarded and examined 20,250 vessels of the merchant service, of which number 645 were reported to the proper authorities for violations of the customs and navigation laws, incurring penalties to the sum of \$210,994. There were assisted sixty-seven vessels, with 694 persons on board, in actual distress—the value of which ships, together with their cargoes, amounted to \$1,011,807. The pecuniary value of the services thus rendered to the government and to commerce represents a sum equal to \$1,222,801, which is \$287,801 in excess of the annual appropriations for the running expenses of the service. In the conduct of humane errands alone, the vessels of the revenue cutter service have cruised 6,681 miles, and have saved the lives of seventy-eight persons, sixty of whom were actually taken from the water and rescued from drowning, while the others were relieved under circumstances of danger and destitution."

### Buffalo Grain Trade.

Figures presented in the following table show the enormity of the Buffalo grain trade and also direct attention in a most forcible manner to the reduction in the Erie canal portion of the trade as compared with 1886. The present season has certainly been a record-breaking season in this trade, not only as regards the volume of the grain movement, but also from the fact that vessels have carried grain from Chicago to Buffalo practically up to Christmas day. The figures show that receipts of grain and flour at Buffalo during the season will exceed 200,000,000 bushels, or more than 5,500,000 tons.

#### RECEIPTS OF GRAIN BY LAKE INCLUDING FLAXSEED.

1886.....	75,570,850 bushels.	1895.....	122,673,937 bushels.
1894.....	105,435,577 bushels.	1896(to Dec. 5)	171,527,137 bushels.

#### SHIPMENTS OF GRAIN BY CANAL INCLUDING FLAXSEED.

1886.....	45,071,163 bushels.*	1895.....	30,236,144 bushels.
1894.....	50,083,521 bushels.	1896.....	41,306,160 bushels.

\*Flax not included in 1886.

#### RECEIPTS OF FLOUR BY LAKE.

1886.....	4,582,190 barrels.	1895.....	8,971,740 barrels.
1894.....	11,488,530 barrels.	1896 (to Dec. 1)	9,245,790 barrels.

Joseph R. Oldham of Cleveland has an article in Cassier's Magazine for January on "American Lake and Ocean Steamship Models." Although Mr. Oldham has not professed a special knowledge of vessel machinery since coming to the lakes, he seems, in this article, to refer back to and discuss with some doubt a point in marine engineering that has been passed upon by the eminent designers of marine engines. He says: "There are, no doubt, great advantages connected with the adoption of twin screws, but, in my opinion, these advantages may be too dearly bought. For merchant steamers the cost of production is greater, the cost of insurance increases in an equal ratio, a larger engine-room staff is required, and extra cost of maintenance is involved. But of more importance than all is the extra weight of machinery required for a twin screw over a single screw of equal speed. The owners and builders should be the best judges of the type of steamer most suitable for their trade. Increased length means increased risk when navigating shallow and tortuous rivers and harbors, and for such work twin screws are certainly more suitable than a single screw would be; but the general economic efficiency available by resorting to augmented length and single-screw propulsion is manifest."

The Review has excellent photographs of lake ships.



### Exhaustive Discussion of the Boiler Question.

In almost every issue for two weeks past the New York Herald has devoted one to three columns to the discussion of the water tube boiler question. Although these interviews and communications have really brought out nothing that is new to engineers who have kept posted on the advancement of the water tube boiler, they have brought out an expression of opinion from leading ship builders in England and this country that could never have been collected in any other way in so short a time. The scope of the New York paper's work is simply wonderful. The force of its European edition has been used, and all of the eminent engineers of England and Scotland who have for two or three years past taken part in the discussion on both sides of the boiler question have been interviewed. The drift of opinion in England and Scotland shows a change favorable to the water tube generators, and if the British admiralty comes out shortly with comparisons upholding the bold move they have made in the latest big cruisers, there will be a rush to the water tube boilers in the biggest of ships, especially in cases where high speed is essential.

### Around the Lakes.

Cleveland has 121 vessels in winter quarters, compared with 115 a year ago. The carrying capacity of the fleet of freight vessels, which

where in this issue. This is one of the continuous contract jobs. The amount of dredging to be let at present aggregates about 21,000,000 cubic yards. Another advertisement in this issue calls for proposals on 16,000 feet of breakwater extension at Milwaukee.

Capt. Moses W. Humphrey, father of Capt. M. W. Humphrey of Detroit, manager of the steamer Senator, died in that city on Thursday last. He was eighty-seven years of age and had followed the lakes from 1835 until 1861, when he went to farming and the grain business, but returned to sailing again in 1874. Of late years he has lived with his son in Detroit. In early days he sailed the sloop Geneva and DeWitt Clinton, and later on the brig Europe, bark Mary Stockton, brig Shakespeare and bark E. B. Morgan.

A freight rate of 3½ cents a bushel was paid to the steamer Aurora on the wheat cargo which she has just delivered at Buffalo from Chicago, and which was loaded on Saturday, Dec. 19. If the Aurora had met with delay of not more than twenty-four hours on the trip she would have reached Buffalo on Christmas day. This is certainly an approach to winter navigation on the lakes. John Corrigan of Cleveland, owner of the boat, did not ask the crew to do that which he was unwilling to do himself. He was aboard the vessel.

Mr. A. B. Wolvin of Duluth has decided to give the name Empire



MINNESOTA STEEL STEAMER MARITANA.

includes seventy-three steamers, thirty-nine schooners and five whale-back barges, is about 200,000 net tons. The list does not include harbor tugs or canal vessels.

Godfrey F. Burg, a vessel captain of West Superior, died at the marine hospital in Chicago, Thursday.

Announcements of other resignations in the Northern Steamship Co. will very probably follow that of Capt. W. C. Brown, the marine superintendent. Changes will very probably occur also in commands on the big passenger ships.

Congressman Towne of Duluth is trying to have one of the new gunboats named for the Zenith City. He is also engaged in an effort to bring about a reorganization of custom districts, which he says would result in a big saving to the government on account of the many small districts, which are not self supporting, and which could be cut out.

Receipts of coal by lake at Milwaukee during 1896 are reported as aggregating 1,476,085 net tons, of which 814,246 tons was anthracite and 661,839 tons bituminous. Receipts in other years were: 1895, anthracite 853,680 tons, and bituminous 482,923, making a total of 1,336,603; 1894, anthracite 754,000, and bituminous 495,732, making a total of 1,249,732.

Bids for the big job of dredging in the basin which forms the harbors of Duluth and Superior are called for in an advertisement else-

where in this issue. This is one of the continuous contract jobs. The amount of dredging to be let at present aggregates about 21,000,000 cubic yards. Another advertisement in this issue calls for proposals on 16,000 feet of breakwater extension at Milwaukee.

City to his new steamer, building at the yard of the Cleveland Ship Building Co. The steamer building at Chicago will be named Crescent City, and he will thus have next year the Zenith City, Queen City, Crescent City and Empire City, all of steel, all fitted with Babcock & Wilcox water tube boilers, and all among the largest freight carriers on the lakes. It might be added also that they have all been built on a plan of finances that is a little above the reckoning of old-time vessel-owners.

The United States and Canadian deep waterways commissioners, who have been in session in Detroit for several days past, have adjourned, and it is announced that the United States commissioners have prepared a report, which will be submitted shortly to the secretary of state and through that official to congress. It was not expected that these commissioners could do more than present lengthy reports relating to all kinds of questions involved in the agitation for a deep-water outlet from the lakes to the seaboard, much of the data being collected from discussions of the past. Mr. Cooley, one of the United States commissioners, is reported as saying that he would not again undertake the work he has done alone in this matter for the entire sum of \$10,000 allowed the commissioners for expenses. In view of this statement it is to be hoped that some valuable points may be culled from the report of the commissioners.



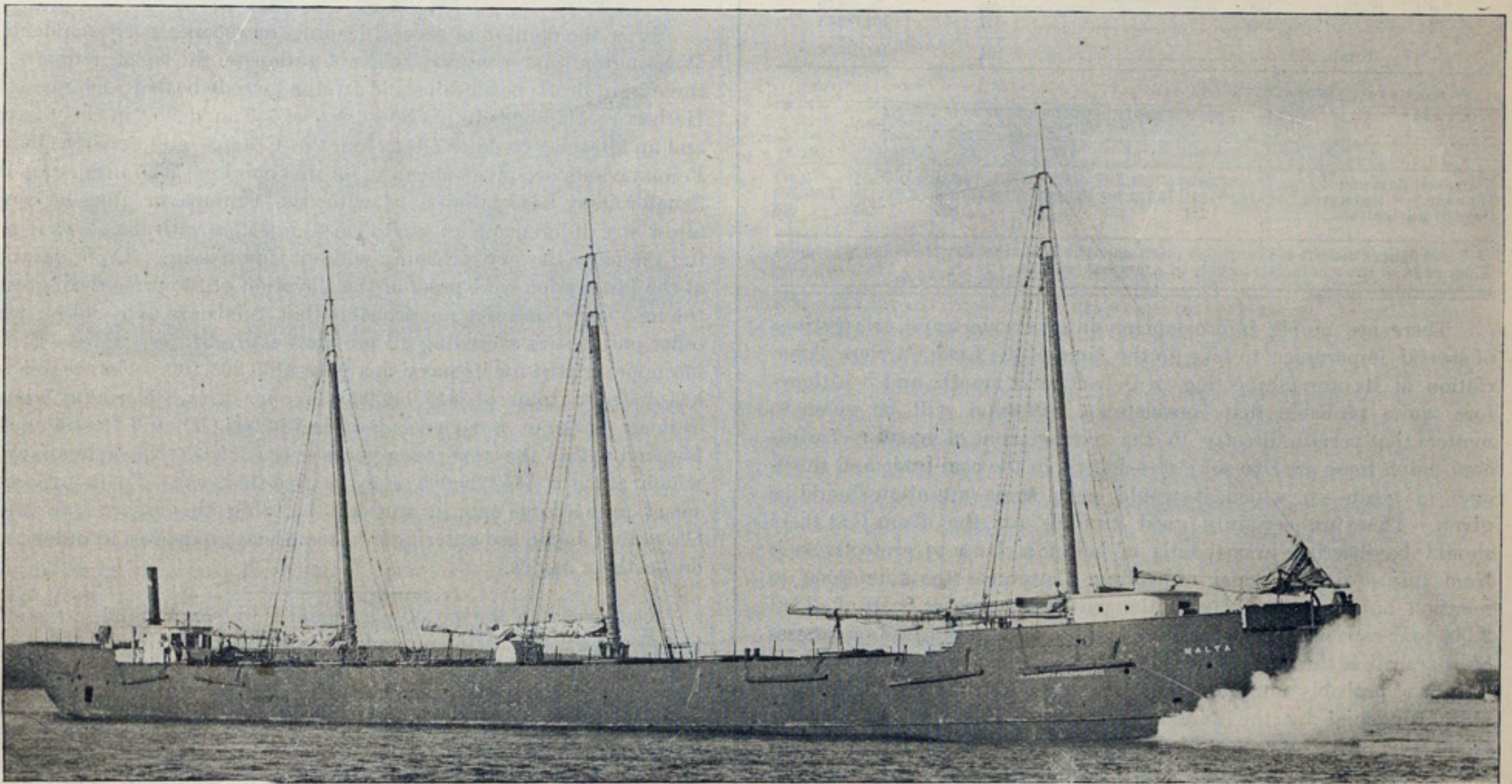
### Five-Year License Citizenship of Officers.

The Washington office of the steamboat inspection service is now sending out to the local boards instructions regarding the law of May 28 last, which authorizes licenses to officers of steam vessels to be issued, after Jan. 1, 1897, for a term of five years instead of one year as heretofore. Inspectors are informed that after Jan. 1, in issuing original, or renewing old licenses they are to issue them for the term of five years. New forms of license are being prepared and they will very probably be in the hands of all inspectors before the first of the year. This is the law passed at the last session of congress through the efforts of the National Association of Marine Engineers, but it applies, as is quite well understood, to all officers in charge of a watch, including pilots. The law also provides that "no person shall be qualified to hold a license as a commander or watch officer of a merchant vessel of the United States who is not a native born citizen, or whose naturalization as a citizen shall not have been fully completed," and in this connection the circular from the Washington office adds: "Inspectors will see that the law as here quoted is carried out, by refusing, after Jan. 1, 1897, to issue licenses except to persons qualified as therein stated, and they should also demand for cancellation all outstanding licenses held by persons not so qualified." A strict en-

anything in the world. This may seem like an exaggerated statement to people who have had to do with ships, and who have for years past heard of the great value of Welsh coal, but the use of Pocahontas coal in trials of United States war ships is conclusive proof of an efficiency equal to the best coal that is to be found in any part of the world. In a recent letter to Messrs. Castner & Curran of Philadelphia, Edwin Cramp, superintending engineer of the Wm. Cramp & Sons Ship & Engine Building Co., says: "I take pleasure in saying that the superior value of Pocahontas coal for steam generating has been fully demonstrated by our experience, which by this time may be considered cumulative. As to the comparative merits of Pocahontas and Cardiff coal, I would state that tests of both coals made by our engineers do not show any material difference between them. As Welsh coal has long held, by considerable odds, the first place in the world for generation of steam, it is a matter for congratulation that we have in Pocahontas coal an abundant supply of American coal of equal value and efficiency."

### In General.

Money has been appropriated for the construction of another fire boat for the city of New York, to cost \$50,000.



MINNESOTA BARGE MALTA.

forcement of this law will very probably result in more careful inquiry as to the citizenship of all deck and engine-room officers of American merchant vessels.

### Trade Notes.

All of the torpedo boats now being built for the United States navy are equipped with Blake pumps.

Officials of the Buffalo Forge Co., Buffalo, N. Y., are especially pleased with a testimonial that came to them unsolicited from Capt. John Green of Buffalo, who is very well known among lake vessel owners. Capt. Green says: "In accepting of your forced draft plant in the steamer Lewiston, I take great pleasure in stating that the outfit is more than satisfactory. The results have more than surpassed our most sanguine expectations. The saving per trip from Chicago to Buffalo and return is from fifteen to twenty tons of coal, which very soon repaid the cost of the plant. In addition to this, the speed of the boat has been increased a quarter to half a mile per hour over the best previous time. This increase in speed is due to the fact that there is no variation in steam in cleaning fires. The application of the forced draft outfit to the boiler plant has also had the result of obtaining greater steaming capacity of the boilers. I can heartily recommend this system of mechanical draft for lake boats to anyone."

The United States now has a steam coal that is not excelled by

Congressman Snover of Michigan, who is from the St. Clair district, will lend considerable assistance to lake shipping interests in securing appropriations for river and harbor improvements, aids to navigation, etc. It is understood that he is thoroughly in sympathy with the vessel owners.

German ship builders have undertaken some work of late that indicates a decided advance in the industry in that country. Four 32-knot torpedo boats building at the Schlenker works, Ebling, for the Chinese government will have engines of 6,000 horse power each and are to be completed within thirteen months from the date of contract.

Secretary Herbert of the navy has addressed a letter to congress incorporating a statement of the claim of the William Cramp & Sons Ship & Engine Building Co. for \$1,368,243.49 for extra compensation for loss due to delays alleged to have been caused by the government, in the construction of vessels, viz., for the New York, \$211,018.31; Columbia, \$192,235.79; Massachusetts, \$483,757.49; Indiana, \$480,231.90. In each case it is alleged by the contractors that the delays complained of were due to the failure of the government to supply the armor or other materials in accordance with the provisions of the contracts, and in the case of the New York that further delay occurred by reason of the changes authorized by the department. The secretary recommends the reference of the claims to the court of claims.





DEVOTED TO LAKE MARINE AND KINDRED INTERESTS.

Published every Thursday at No. 409 Perry-Payne building, Cleveland, Ohio,  
by John M. Mulrooney and F. M. Barton.

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binders sent, post paid, \$1.00. Advertising rates on application.

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The books of the United States treasury department on June 30, 1896, contained the names of 3,333 vessels, of 1,324,067.58 gross tons register in the lake trade. The number of steam vessels of 1,000 gross tons, and over that amount, on the lakes on June 30, 1896, was 383 and their aggregate gross tonnage 711,034.28; the number of vessels of this class owned in all other parts of the country on the same date was 315 and their tonnage 685,204.55, so that more than half of the best steamships in all the United States are owned on the lakes. The classification of the entire lake fleet on June 30, 1896, was as follows:

	Number.	Gross Tonnage.
Steam vessels.....	1,792	924,630.51
Sailing vessels and barges.....	1,125	354,327.60
Canal boats.....	416	45,109.47
Total.....	3,333	1,324,067.58

The gross registered tonnage of the vessels built on the lakes during the past six years, according to the reports of the United States commissioner of navigation, is as follows:

Year ending June 30, 1891.....	204	111,856.45
" " " 1892.....	169	45,968.98
" " " 1893.....	175	99,271.24
" " " 1894.....	106	41,984.61
" " " 1895.....	93	36,352.70
" " " 1896.....	117	108,782.38
Total.....	864	444,216.36

ST. MARY'S FALLS AND SUZCANA LAKES, 1895. (From Official Reports of Canal Officers.)

	St. Mary's Falls Canal.			Suez Canal.		
	1895*	1894	1893	1895	1894	1893
No. vessel passages.....	17,956	14,491	11,008	3,434	3,352	3,341
Tonnage, net registered.....	16,806,781	13,110,366	9,849,754	8,448,383	8,039,175	7,659,068
Days of navigation.....	231	234	219	365	365	365

\* 1895 figures include traffic of Canadian canal at Sault Ste. Marie, which was about 1/4 per cent. of the whole, but largely in American vessels.

There are no big improvements in lake waterways or questions of special importance to take up the time of the Lake Carriers' Association at its annual meeting in Detroit next month, and it is therefore quite probable that considerable attention will be given to matters that pertain directly to the management of vessels. In this connection there are two subjects—delays in the coal trade and shortages in grain—to which, it would seem, some attention should be given. There are certainly good grounds for the claim that there should be inserted in coal bills of lading a clause to protect vessels from unjust delays when unloading. Instances too numerous to mention have occurred during the past season where boats of about 2,000 tons capacity have been nine and ten days getting rid of cargoes after arrival at the port of discharge; and when unloaded, with a freight of probably not more than 20 cents a ton, matters were made more congenial by the announcement that they had weighed out twenty or thirty tons short of the amount called for in bill of lading. The association can, by going at this matter rightly, insist that all coal bills of lading contain a clause specifying that after vessels report at places of unloading they be furnished a dock within a certain time and unloaded within at least three days. Matters more difficult than this have been settled by the association. Will the members take hold of this question and present a determined position? United action is all that is wanted in the matter. The grain shortage question is an old one, and, to say the least, the inability of vessel owners to settle it stands as a reproach to their organization. There is nothing business-like in the present method of dealing with shortages and over-runs. Vessel owners should have some certain redress from the mistakes of the elevators. It is certainly unjust that any vessel owner should be compelled to pay for a shortage, whatever may be said of the advantage of over-runs, when he feels that the shortage is due to no fault on his part and can be accounted for only through error in weights. There is an instance of the past season where an elevator weighed out a cargo that was pronounced 300 bushels short but upon being weighed again into cars an over-run of fifty bushels was found. It is a rare thing to have mistakes of this kind found so readily. In this case there was a sudden discovery of scales being out of order, but how often do owners follow up these shortages? They usually accept the remittance of freight and wonder at the rest. These abuses in the vessel business have been talked of long enough. It is in order, now that there is time for it, to take up these questions and dispose of them.

Until the past year or so all reference to advancement of the ship-building industry in this country has been ridiculed by most of the shipping journals in England. But these same journals have of late shown a different disposition, probably not so much from alarm on account of the progress of American ship building as from the actual competition that British builders are meeting with in Germany and other countries. Prof. Biles, who has several times been consulted by American ship builders and ship owners, seems to have especially incurred the ill will of the British press. A writer on ship building subjects in Fairplay of London says in a recent number of that journal: "I notice that Prof. Biles of the University of Glasgow is credited with assisting in the design of torpedo boats for the United States, and it is further stated that several students are being sent over to Glasgow to be instructed in naval architecture. I presume that the professor is quite at liberty to do this, but considering the noise that is being made about foreign competition one would think that a line should be drawn as to how far anyone who occupies such a position should be allowed to go in the instruction of foreigners. It appears that Prof. Biles ranks amongst his students Japs. and other nationalities, all of whom are itching to stand upon their own legs and compete with us. I am of the opinion that some inquiry should be made as to the number and nationality of the students in the Glasgow University, and that some stop should be put upon the professor."

It is the opinion of several leading newspaper correspondents in Washington that congress will not authorize the construction of the three light-draft battleships and twelve torpedo boats which Secretary Herbert recommends in his latest report. The deficit in the treasury and an alleged "coolness" between the Cramps and Senator Quay of Pennsylvania are given as causes for this opinion. The intimation that Senator Quay has "fallen out" with the Cramps, or that he would allow any difference with that firm to interfere with his views regarding the navy, is very probably without foundation. Appropriations at the last session were proof of the devotion of the present congress to the new navy, and it is not probable that funds are to be cut off when other nations are exceeding all previous expenditures. Great Britain has appropriated for its navy this year \$106,205,100. France this year has voted a total of \$46,000,000 for her navy. Germany's naval estimate for new war vessels is over \$30,000,000, and Russia expects to spend within the next seven years over \$300,000,000 on her navy, of which amount \$45,000,000 is to be used this year. Spain expects to spend quite a large sum in war ship building this year, and Brazil, China and Japan are entering into some heavy expenses in order to increase their navies.

Congressman Burton of Cleveland is to take a hand in the effort to overcome the treaty memorandum with Great Britain which prevents the building of vessels of war on the lakes. He has gone a step further than any of the other representatives who have taken an interest in this subject, as he has introduced a joint resolution requesting the president and secretary of state "to enter into negotiations with the government of Great Britain to secure, if possible, the abrogation of so much of the treaty of 1817, as forbids the building of warships at ship yards located upon the great lakes." By reason of an experience of several terms in congress, and in view also of his full knowledge of all matters pertaining to the lakes, Mr. Burton can exert considerable influence in directing the attention of congress and the executive to the importance of this question, and it is to be hoped that all other representatives from lake states will join him in trying to bring about some action at the present session.

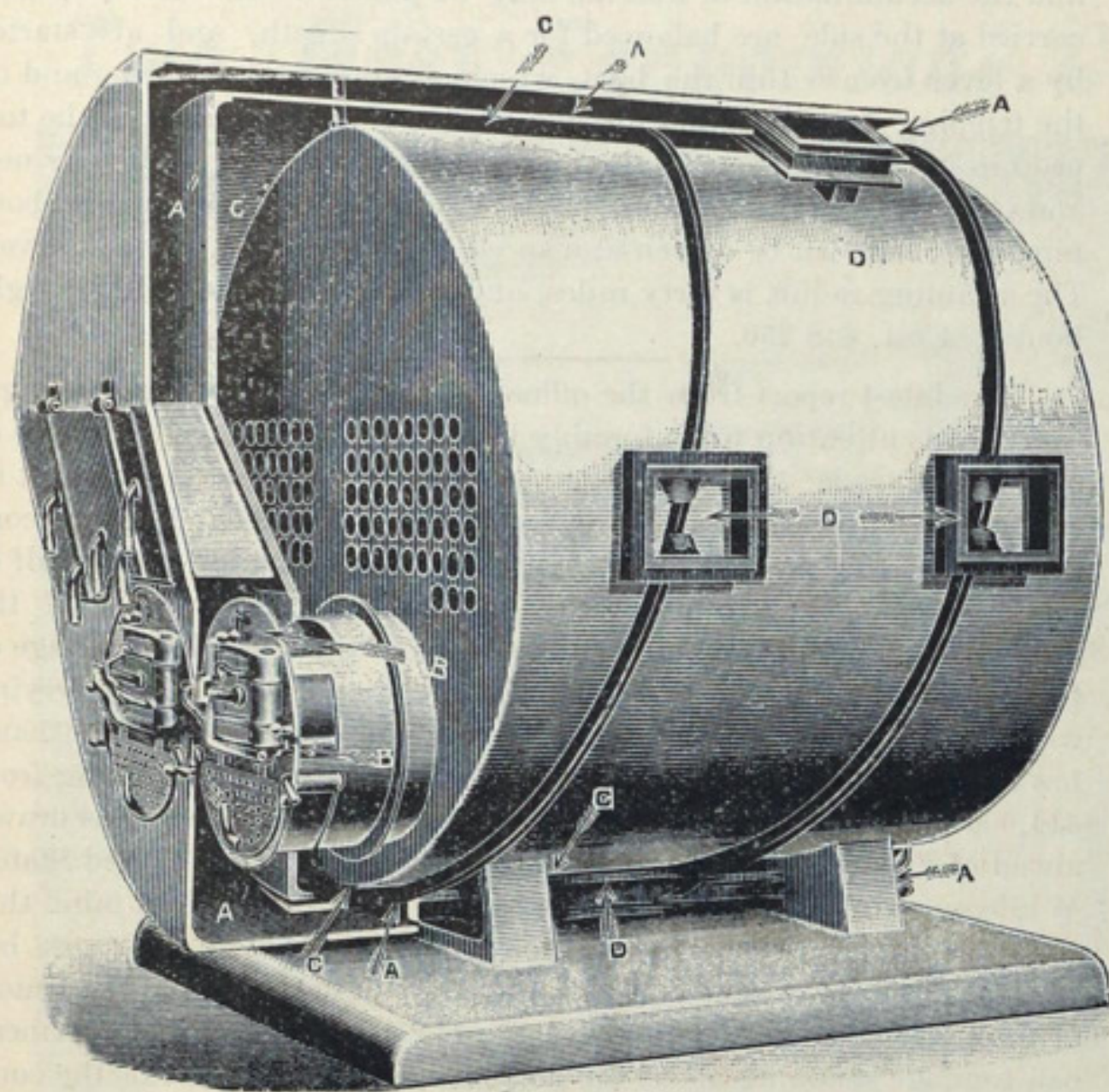
There is \$16,269,342 worth of naval work in progress in United States ship yards. This is for hull and machinery, the armor and armament being additional. The two Japanese battleships, which are to be built at San Francisco and Philadelphia, will swell the total to over \$20,000,000. Of the \$16,269,342 worth of naval vessels, the Newport News company has work aggregating \$7,655,000, or nearly half. Two years ago there was a little over \$15,000,000 worth of naval work in private ship yards.

"Condensation Without Water Supply," is the subject of an article in Cassier's Magazine for January by Louis R. Alberger, who is well known as one of the many capable engineers who have been connected with the establishment of Henry R. Worthington, New York. The article is accompanied by eleven illustrations of water cooling plants with some of their details.



### Eaves' Helical Induced Draught.

Messrs. Sir J. Brown & Co., Sheffield, England, are now introducing a further improvement on the Eaves' induced draft Serve tube system, with which they have been so long identified. By reference to the accompanying illustration the new system will be easily understood. The cold air for the combustion of the fuel enters from the back end of the boiler, passing along the outer space A and A' to the valves B and B' in the furnace fronts; on its way this cold air is guided round the outside of the inner space C in a helical direction by



partitions set up as shown. After combustion the waste hot gases leaving the boiler pass through the smoke-box into the inner space C, and are made by similar partitions to pass round and in close contact with the boiler in a helical direction on their way to the suction fan. The boiler by these means is thoroughly enveloped in the escaping heat, effectually preventing either radiation, condensation or straining of the boiler under any forced conditions, such as rapid generation of steam from cold water, or sudden and greatly increased evaporation. The cold air on its way to the valves also absorbs a large amount of heat from the escaping gases, and so enters the furnaces at a greatly increased temperature with resultant economy. No blocking up of the bottom boiler tubes through any deposit in the smoke-box can, it is claimed, take place, as such deposit, if any, drops to the bottom of inner casing C, from whence it is easily removed by doors at front. The doors D are placed so as to allow of a brush being passed through, to sweep away any sooty deposit from the boiler shell, should any such deposit take place. The manufacturers report that very careful experiments have been made with this system, with results varying from 78 to 82 per cent. of efficiency, and a coal consumption of from 30 to 35 pounds per square foot of grate. The trials gave a boiler efficiency in one case of 82 per cent. and in the other 78 per cent. of the actual calorific value of the coal used. If we take the mean of these figures, namely, 80 per cent., and work out the evaporation on the basis of the best Welsh coal, we obtain the following results:—Heat units from complete combustion of 1 pound of best Welsh coal, 15,629; latent heat of evaporation from and at 212 degrees Fahrenheit, 966; caloric value of coal in pounds of water evaporated per pound of coal from and to 212 degrees Fahrenheit— $\frac{15,629}{966} = 16.18$  pounds; 80 per cent. of the above calorific

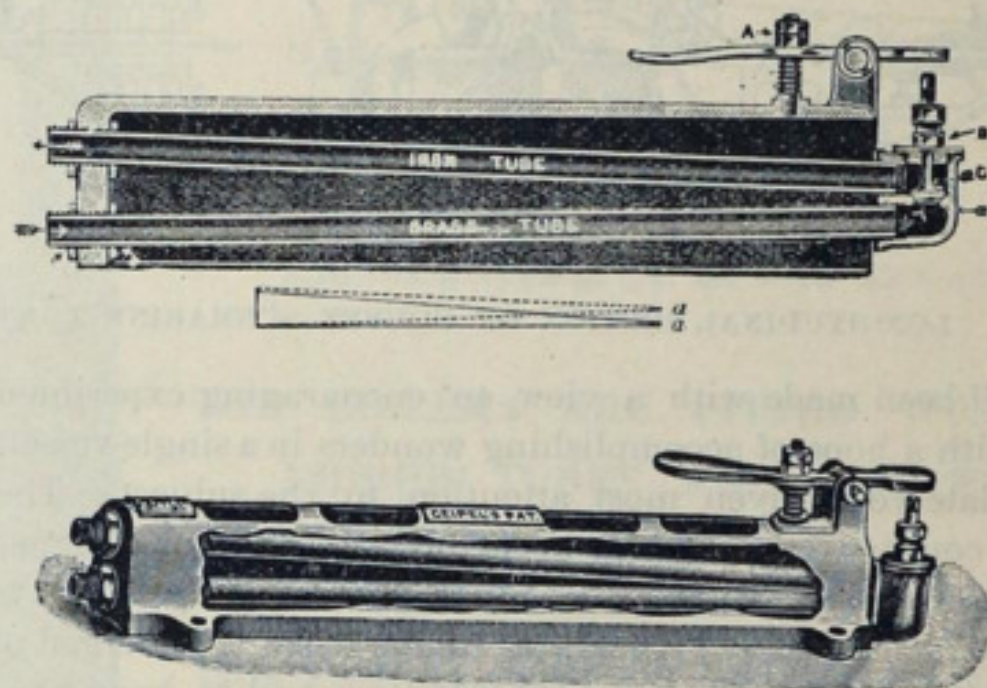
value =  $\frac{16.18 \times 80}{100} = 12.95$  pounds; or practically an evaporation

of 13 pounds of water per pound of coal from and at 212 degrees Fahrenheit, with a rate of combustion over 30 pounds of coal per square foot of grate, and with a ratio of heating surface to grate surface of only 28 to 1. An ordinary marine boiler of the same dimensions as the one used in these trials, namely, 10 feet 6 inches diameter by 10 feet 6 inches long, will, with good natural draught, evaporate

about 5,000 pounds of water per hour, the efficiency being about 65 per cent., or equal to 10.5 pounds of water evaporated per pound of best Welsh coal from and at 212 degrees Fahrenheit, instead of 13 pounds. The trial boiler has now been at work nine months, and on examining the shell it was found to be free from any sooty deposit, in excellent condition, and no signs of corrosion or leakage visible. —The Engineer, London.

### Geipel Steam Trap.

The Geipel steam trap, which is used largely by British ship builders, and which is fitted to the steamer Inchmona, whose record has received considerable attention of late, is illustrated herewith. This trap is positive in its action, and it is stated that there is a distinct economy in steam gained by its use, and further that there is also an economy in packing. These things may be difficult to prove, but there



is little doubt that leaky steam traps are responsible for considerable waste of steam. A celebrated foreign expert, Prof. Kennedy, has stated that in his trials they, the steam traps, required more looking after than the whole of the rest of the machinery put together.

The action of the Geipel trap will be apparent to all engineers who study the illustration. The lower or brass pipe is connected to the steam pipe, the upper iron pipe forming the discharge. A very slight expansion in the brass pipe will cause the apex at which the valve is situated to rise a considerable distance; the valve spindle then butts against the lever, and there can be no passage of either steam or water until, by cooling down, the apex is caused to descend, and the valve can rise with freedom. When it is desired to blow through, the valve may be opened by hand by merely pressing down the lever. The valve may be readily examined by unscrewing the top.

The trap is very suitable for fixing on the bed plates of engines, for which purpose many forms of steam traps are too bulky. The Central Marine Engineering Co. of West Hartlepool, a well-known ship building concern, is said to have used, within the last six months, upwards of 100 of these steam traps. The White Star Steamship Co. has them in use. The trap has very few working parts, and the merits claimed for it are well worthy of consideration by those having use for this sort of appliance. It is manufactured by Thorpe, Platt & Co., No. 97 Cedar street, New York.

### Stocks of Grain at Lake Ports.

The following table, prepared from reports of the Chicago board of trade, shows the stocks of wheat and corn in store in regular elevators at the principal points of accumulation on the lakes, Dec. 12, 1896:

	Wheat, bushels.	Corn, bushels.
Chicago .....	13,599,000	5,100,000
Duluth .....	2,482,000	6,000
Milwaukee .....	348,000	3,000
Detroit .....	392,000	58,000
Toledo .....	1,135,000	167,000
Buffalo .....	2,878,000	492,000
	20,834,000	5,826,000

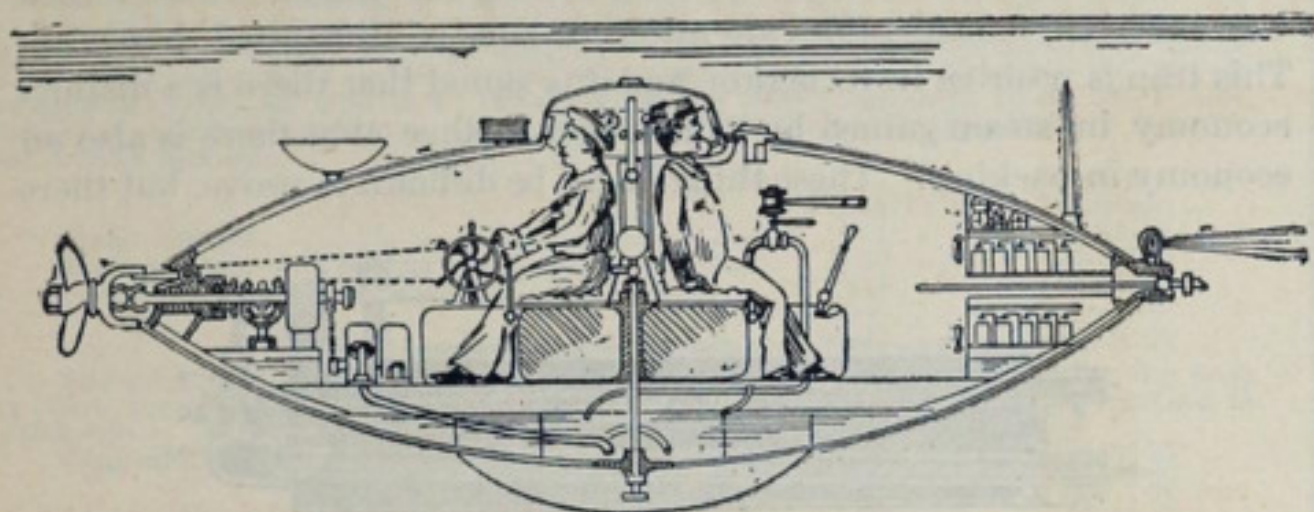
As compared with a week ago, the above figures show, at the several points named, an increase of 577,000 bushels of wheat and 236,000 bushels of corn.

Solid through trains between Chicago, Buffalo and New York city, and through sleeping cars to Boston, constitute the through service of the Nickel Plate road. Rates always the lowest. 412Dec.31



### Submarine Boats.

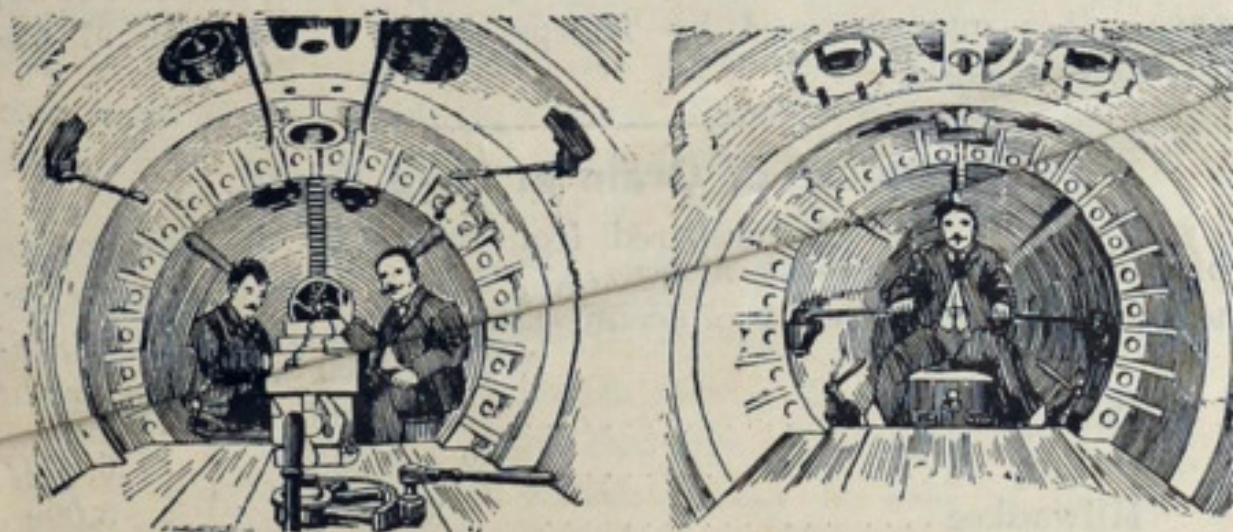
Now that the Columbian Iron Works of Baltimore is about ready to launch the Holland submarine torpedo boat, which is being built for the United States government, it is quite probable that the newspapers will be filled with accounts of the revolution in methods of naval warfare that will follow the completion of this craft. As a matter of fact, there is, however, considerable doubt as to whether the secretary of the navy, who is authorized to spend \$175,000 for two more such crafts, will decide to go ahead with the contracts for them. Expenditures of the leading maritime governments on submarine boats



LONGITUDINAL SECTION OF GOUBET SUBMARINE BOAT.

have all been made with a view to encouraging experiments, rather than with a hope of accomplishing wonders in a single vessel. France has of late years given most attention to the subject. The ministry of that country only recently invited competition for designs, in which the following conditions were to be filled: A speed of 12 knots; a radius of 100 miles at 8 knots; a radius when submerged of 10 miles at 8 knots; limit of displacement 200 tons, and to have two torpedoes ready to discharge. Very complete plans must be submitted and a prize of \$1,930 will be awarded for the best, and lesser prizes for others possessing merit. A second set of prizes, amounting in all to \$1,930, will be awarded for the best solutions of special features of submarine navigation, as follows: First, the motive power and its control; second, the regulation of the immersion, stability and directive force under water; third, safety apparatus of all sorts; fourth, means of sighting and keeping lookout; fifth, offensive and defensive apparatus.

French builders now have contracts for five boats of the Goubet type for Brazil. Two of them have been completed. This new type is known as the Goubet II and is a spindle shaped vessel 26.2 feet long and 5.7 feet in diameter, the hull being formed of a series of broad rings with flanges for bolting them together. On top, midway of the length, is a circular hatch or manhole 14 inches high, with a dome-shaped cover. There is a fin keel at the bottom, and side keels as well, the latter supporting skeleton discharge tubes for automobile torpedoes. Oars working through universal water-tight joints afford a means of propulsion in case of accident to the motive power. A screw propeller projects from the stern, completing the list of external features



MECHANISM, AFTER END—VENTILATING LEVERS, FORE END.

ures of the hull. The hull plating is of bronze, varying from 0.27 to 0.86 inches in thickness. The vessel rises or sinks with the expulsion or admission of water, the reservoirs being in what might be called the double bottom. The amount of water in the reservoirs is controlled automatically by means of a hydrostatic apparatus set for some particular depth, which controls the electric current driving the dynamos that fill or empty the reservoirs. If the buoyancy should be suddenly altered by the loss of the detachable weight from the keel, or other cause, the original plane of immersion would be restored

automatically by the admission of water. A similar device maintains the longitudinal stability, even when the crew move forward or aft. With crew and stores on board the boat is awash, but additional buoyancy can be obtained by detaching the weight at the keel. The propeller works in a system of ball and socket joints, enabling its use for steering, as well as for propulsion. A telescope can be projected upward through the dome, when near the surface of the water, for about 10 feet. It is fitted with reflecting mirrors, enabling the captain to see above the surface. Fresh air is furnished by reservoirs of oxygen, and the accumulation of foul air may be pumped out. The torpedoes carried at the side are balanced for a certain depth, and are started by a lever from within the boat, which acts on a strong spring and on the tripping lever of the torpedo, and so sets the screws of the torpedo in motion. There is also an apparatus for cutting cables or nets and for removing obstructions under water. The boat weighs about nine tons, and can be driven at a speed of 7 knots by 1.5 horse power. The steaming radius is forty miles, and it must be habitable for eight hours. Cost, \$48,250.

The latest report from the office of the commissioner of navigation directs attention more forcibly than ever, to the steady decline of our foreign trade. Taken altogether our deep sea commerce—that is, our trade with foreign ports—was conducted, as far as our flag was concerned, for the past year in fewer than ninety ships, about half of which were engaged in plying to and from the West Indies. Of the ten maritime nations owning nine-tenths of the sea going tonnage of the world the United States and Italy alone have a less carrying capacity than twenty years ago. Within the past ten years Germany has outstripped the United States, her steam tonnage increasing from 414,000 tons in 1885 to 893,000 tons in 1895; and Norway has drawn ahead of France and is rapidly drawing close to the United States. While our rank is third among nations, it must be borne in mind that we hold this rank not by virtue of our trans-oceanic voyages, but because of our extensive navigation of the West Indies and the waters of the Caribbean sea, together with the addition of the enormous American tonnage steaming about the great lakes. As proof of this the commissioner states that from the entire coast of the United States only two American vessels last year made the voyage to Liverpool and none made the voyage to Hamburg or Bremen.

### Garlock's High Pressure Packing.

It is an old saying that everything changes, and to be up to the times the steam engineer must be ever on the alert. It is but a few years ago that steam at six atmospheres was considered a very high pressure, and was about the limit on steamships and steam plants. Today on the modern compound or triple expansion engines 150 pounds is a common pressure, and in many cases a pressure of 250 pounds is used. One change usually necessitates another, and engineers have found that valve and piston packings that have given satisfactory results when used on engines working with 100 pounds pressure, or under, can not be used on the compound and triple expansion engines working under a high pressure. The Garlock Packing Co., ever



alive to the requirements of engineers, about two years ago perfected, and placed on the market a high pressure piston packing made of selected material and used in combination with the celebrated Garlock packing compound, which has so successfully withstood the trials and hardships of stuffing-box life on the largest engines for so many years. This packing is particularly adapted to high pressure work on locomotive, stationary and marine engines. It is being used with success in the United States navy and in the merchant marine service. The construction of this packing is without question designed to insure long service. It is made in all sizes, and a free sample will be mailed to any of our readers who will apply for it. The address of the company is Palmyra, N. Y.

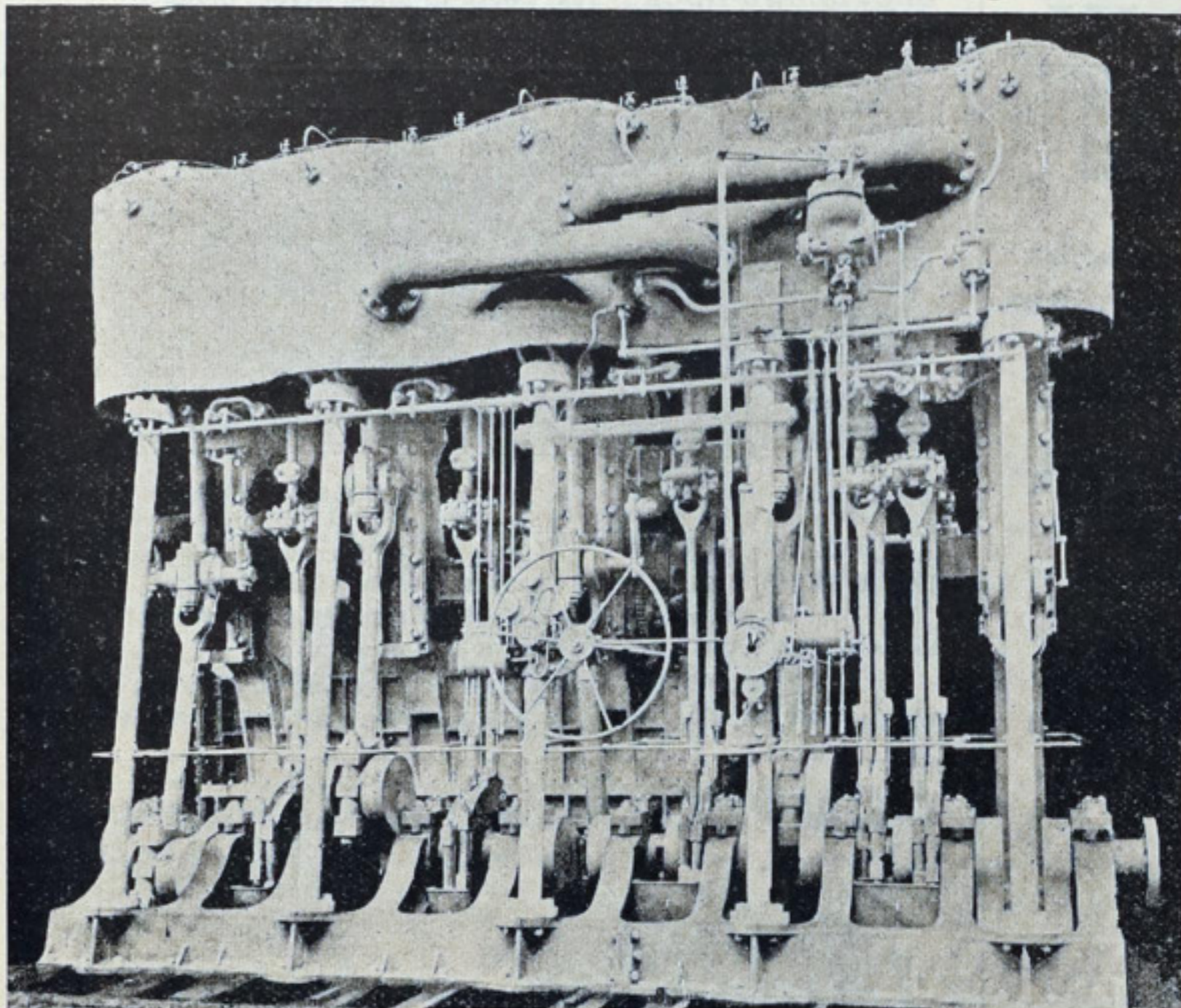
Holiday excursion tickets are on sale via the Nickel Plate road on Dec. 24, 25, 31, and Jan. 1, 1897. Return limit Jan. 4. 409 Dec. 31



# A QUEER COINCIDENCE! THAT SERVE RIBBED TUBES AND ELLIS AND EAVES DRAFT

SHOULD BE IN THE BOILERS OF THE

*Two Most Economical Cargo Steamers in the World!*



ENGINES OF THE INCHMONA—

Hull, 325 feet long,  
46½ " beam,  
20½ " draft,

Engines, 17, 24, 34, 42 and 42 x 42 in. stroke.

THE BOILERS ARE FITTED WITH SERVE RIBBED TUBES AND THE ELLIS AND EAVES DRAFT.

This steamer carries 5,000 tons cargo, 9 knots an hour on a daily fuel consumption of 11½ tons coal. This amounts to 1.07 lbs. of coal per horse power per hour, over ½ pound less than the best showing made by any lake steamer with any kind of draft, and the lowest ever obtained in marine practice.

ENGINES OF THE KENSINGTON—  
(AMERICAN LINE.)

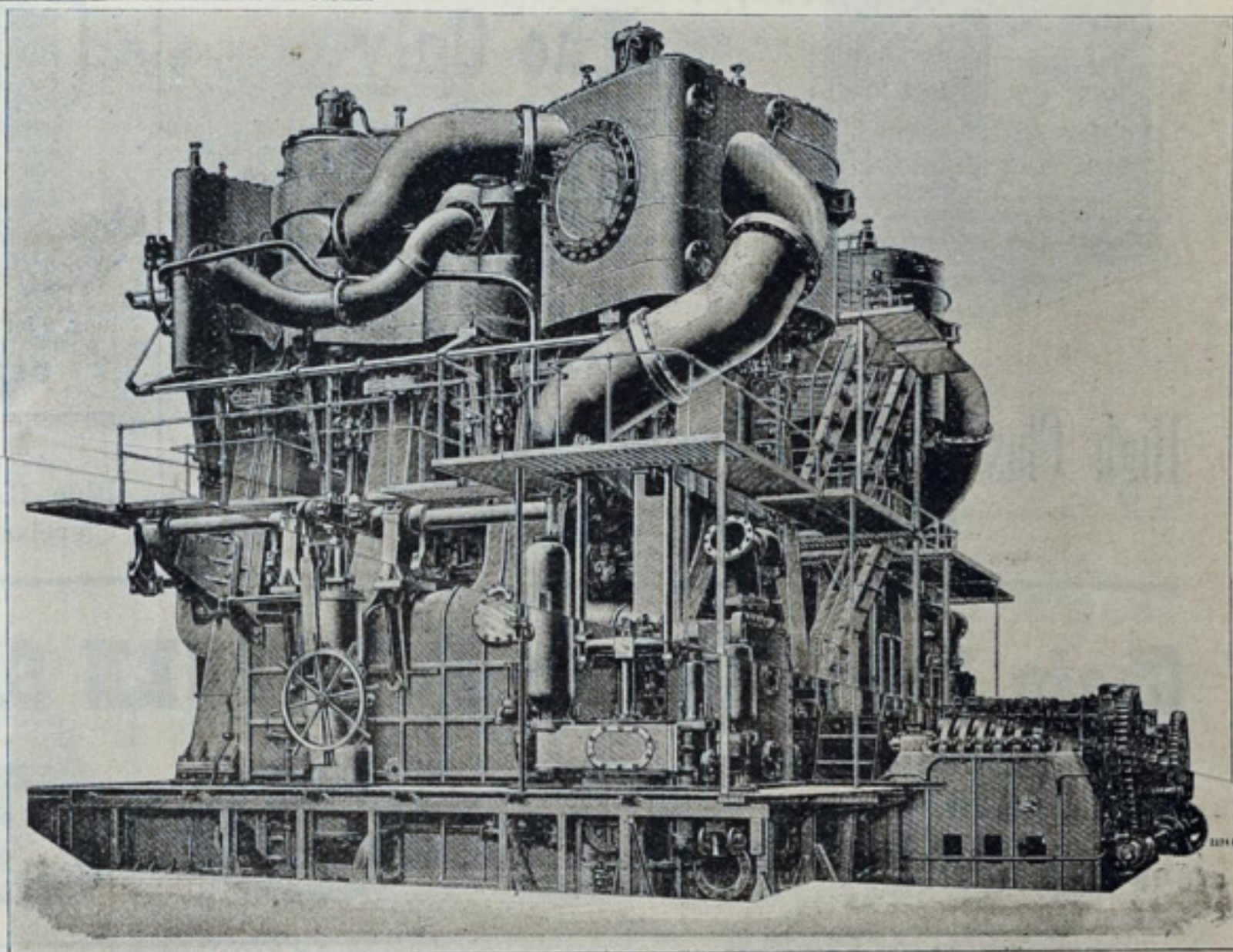
Hull, 480 feet long,  
57 " beam,  
40 " deep.

Twin Engines, 25½, 37½, 52½ and 74 x 54 in. stroke.

Boilers, Two Double-ended,  
15 ft. 9 in. by 21 ft. 5 in.  
One Single-ended,  
15 ft. 9 in. by 11 ft. 3 in.

FITTED WITH SERVE RIBBED TUBES AND THE ELLIS AND EAVES DRAFT.

Coal consumption per I. H. P. per hour on this steamer is 1.4 lbs. This is ¾ lb. less than the average lake steamer. Her cargo capacity is 10,600 tons.



Serve Ribbed Tubes and the Ellis and Eaves Induced Draft are to be installed in at least two lake steamers during the coming winter,—and it can be guaranteed that these steamers will have a fuel consumption as low as 1½ lbs. per I. H. P. per hour. A result of 1¾ lbs. has been obtained with the Ellis and Eaves Draft and Plain Tubes in the L. C. Waldo.

Owners of steamers contemplating repairs to boilers during the coming winter can learn how they can save the cost of the repairs in one season, by writing to

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Superintendent.**DUNHAM TOWING & WRECKING CO.****15 TUGS AT CHICAGO,**  
Chicago Telephone, No. 852 Main.**4 TUGS AT SO. CHICAGO,**  
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**TUGS, STEAM PUMPS, DIVERS, HAWSERS, LIFT-  
ING SCREWS, LIGHTERS, Etc., for Releasing  
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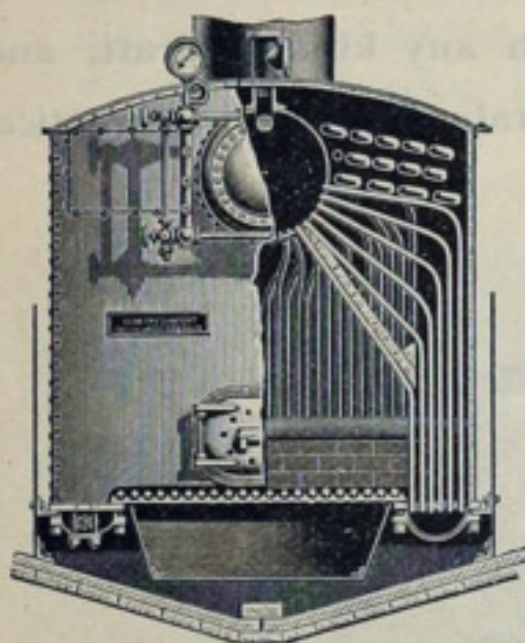
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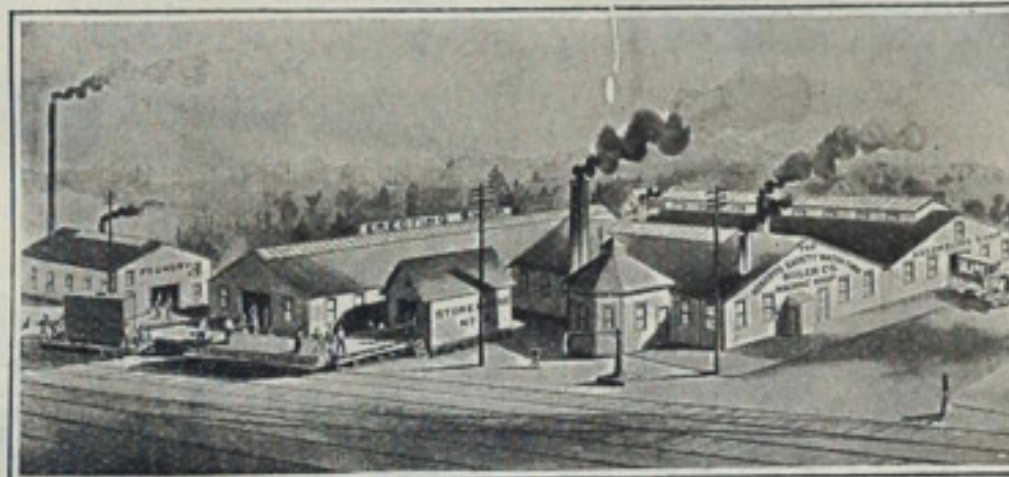
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**The Only  
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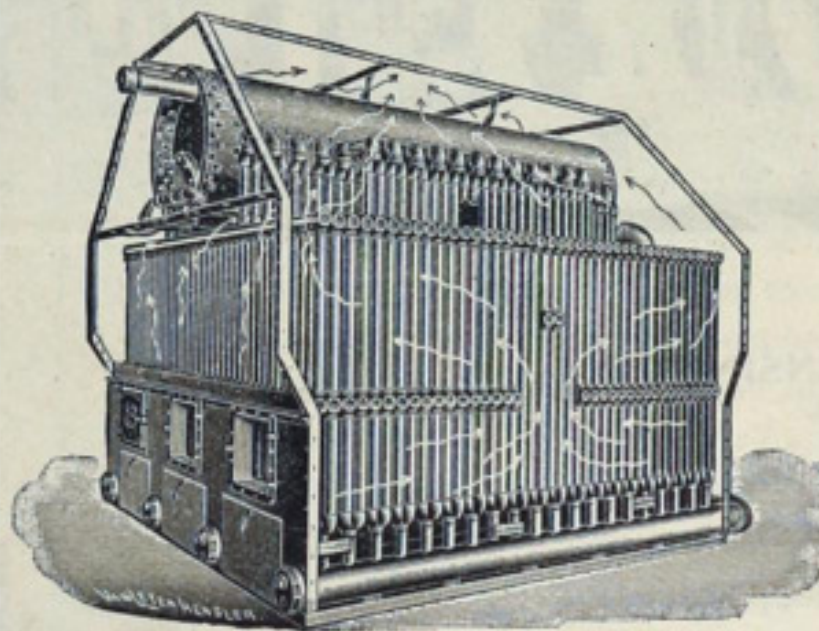
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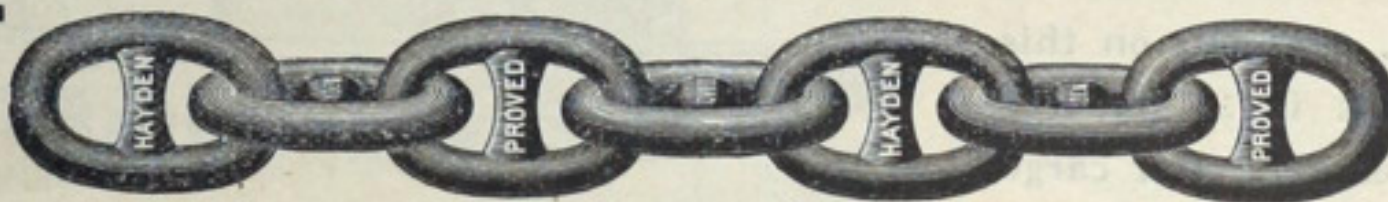
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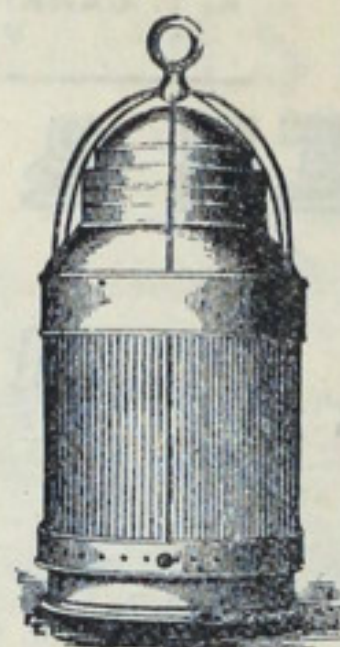
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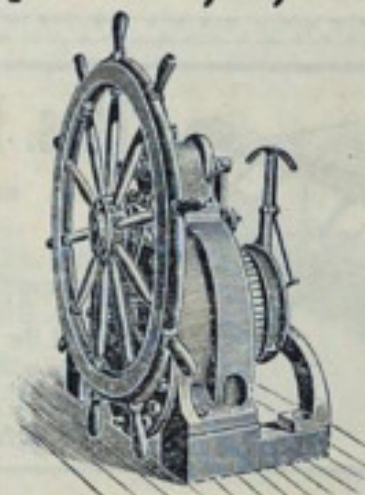
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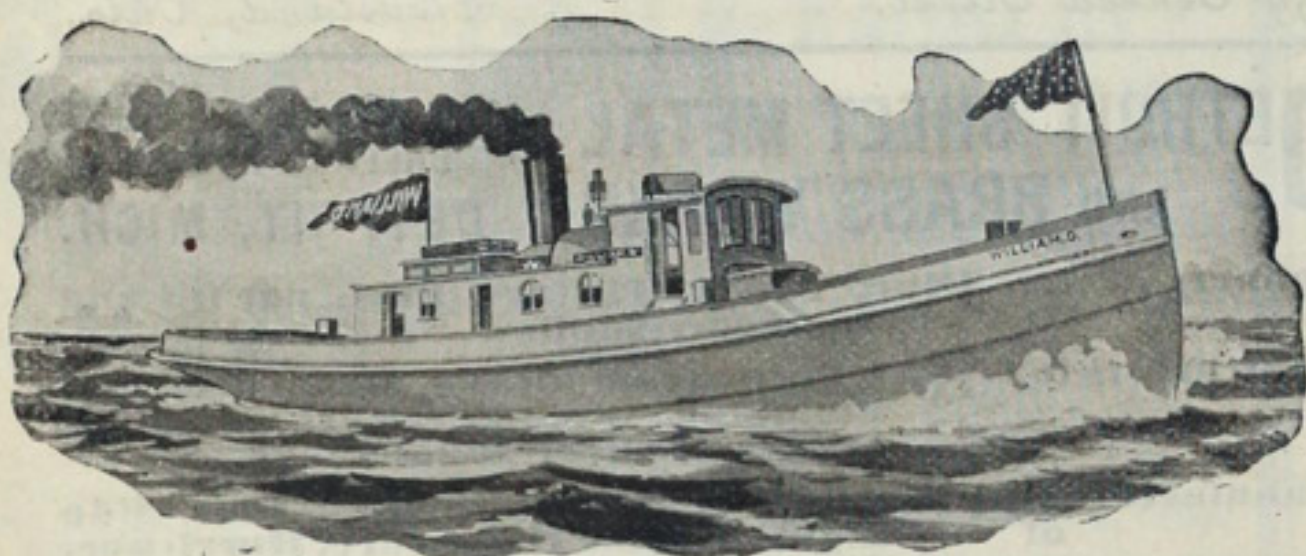
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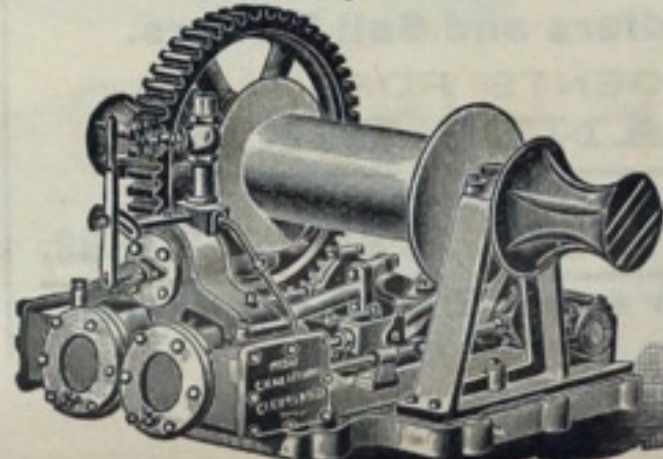
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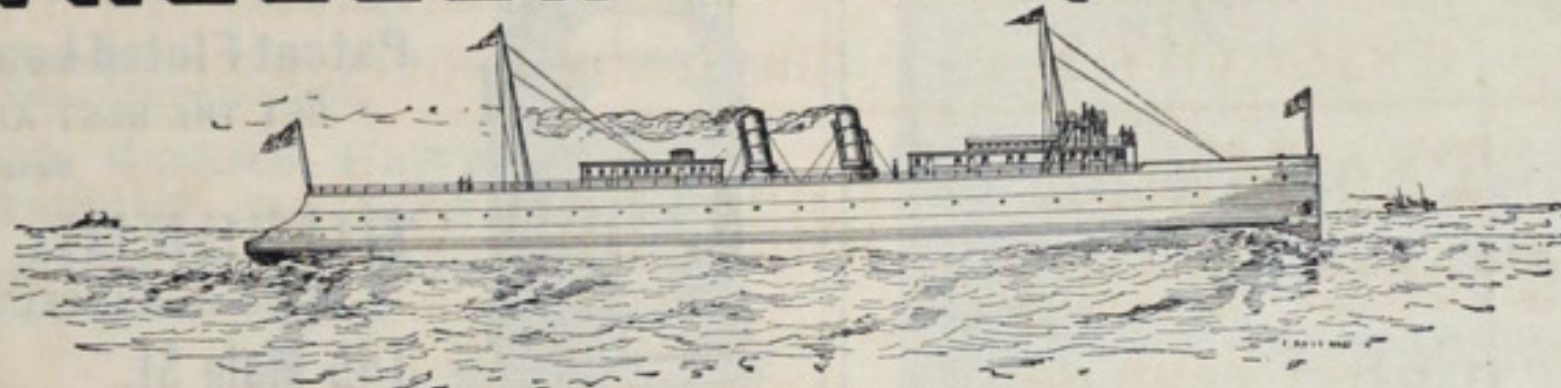
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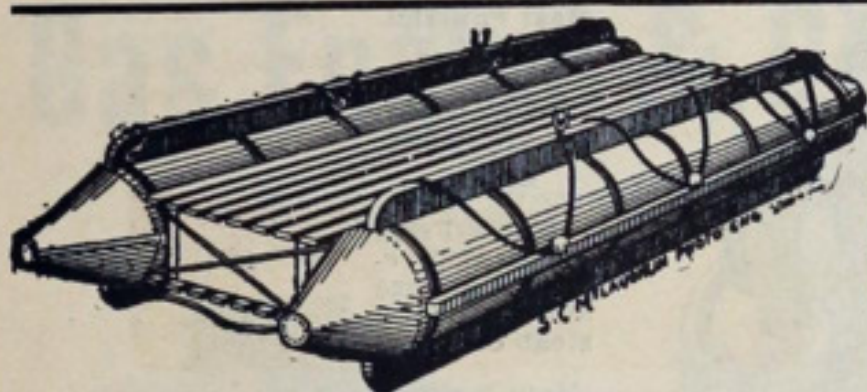
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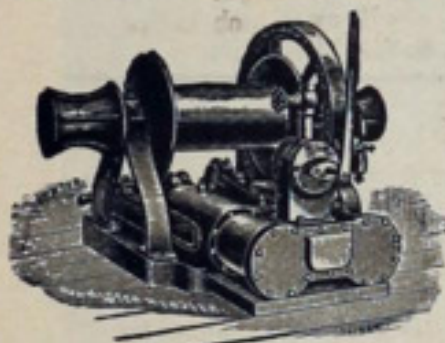
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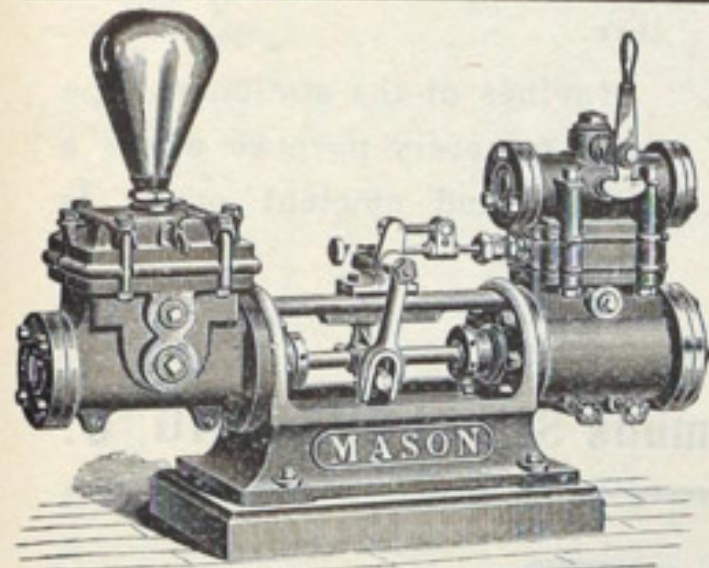
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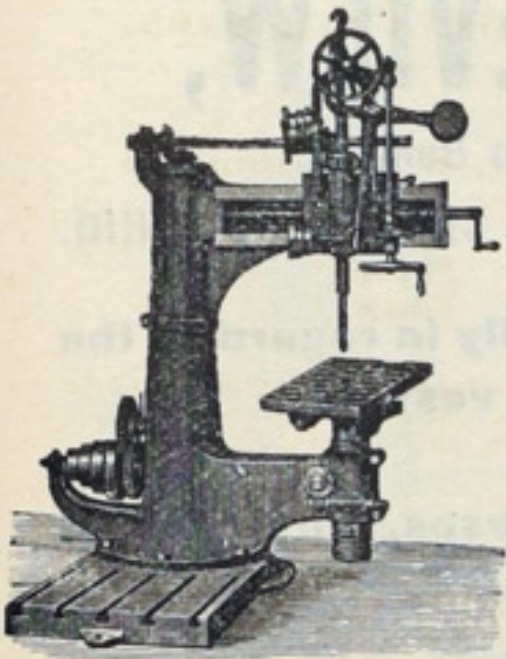
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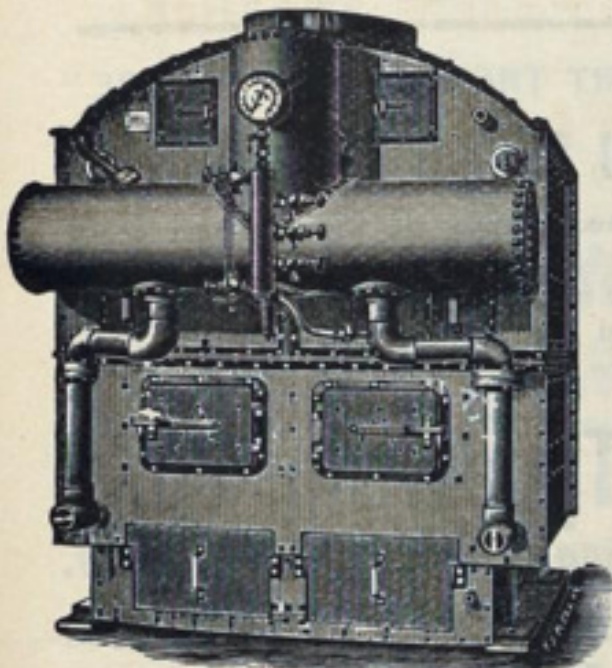
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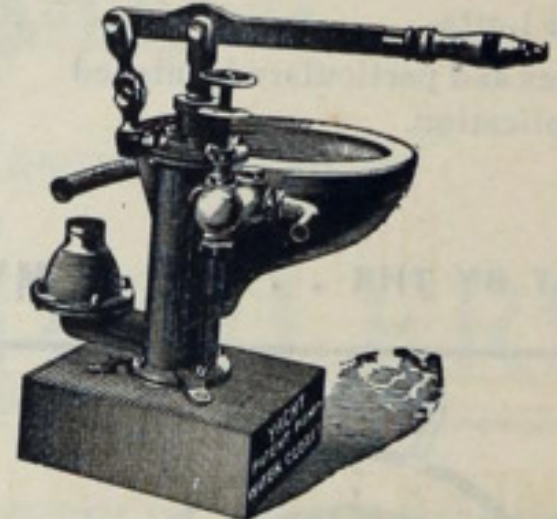
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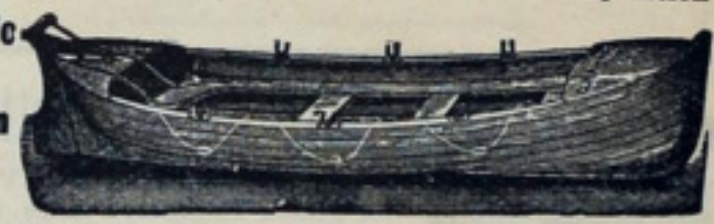
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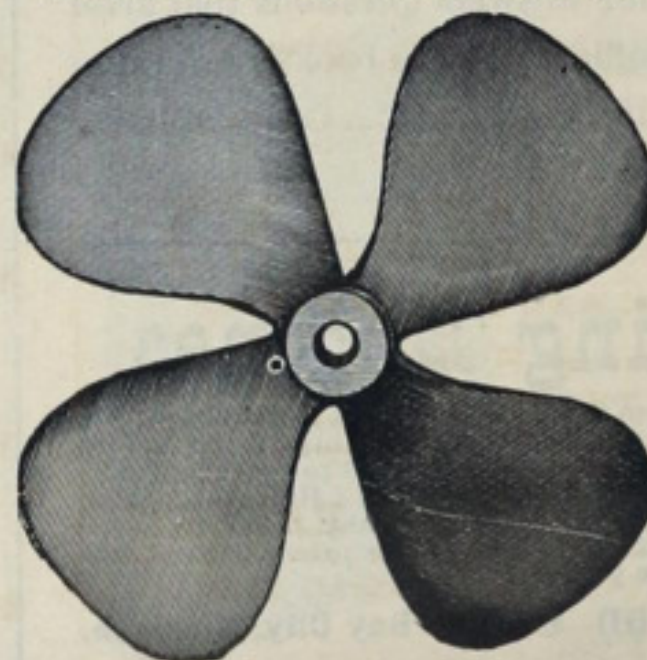
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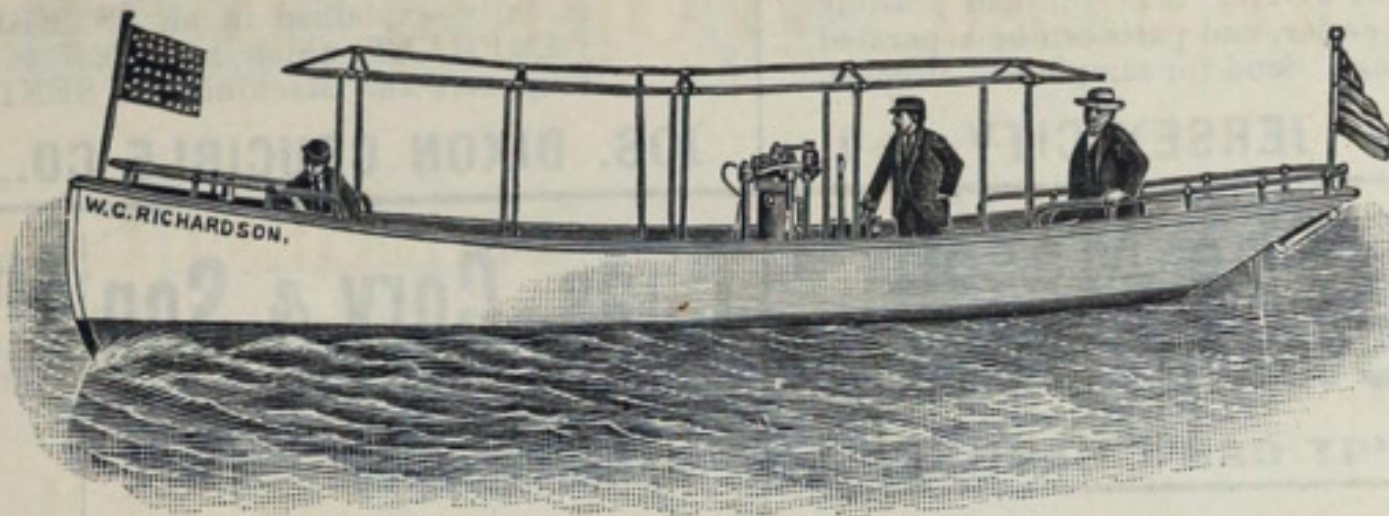


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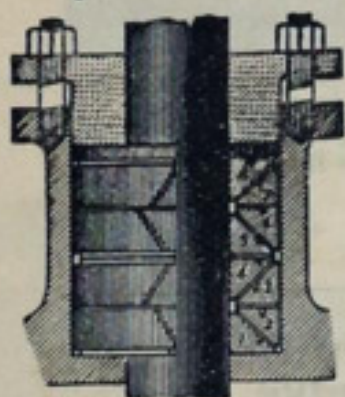
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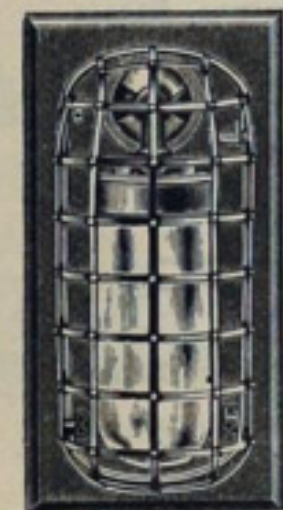
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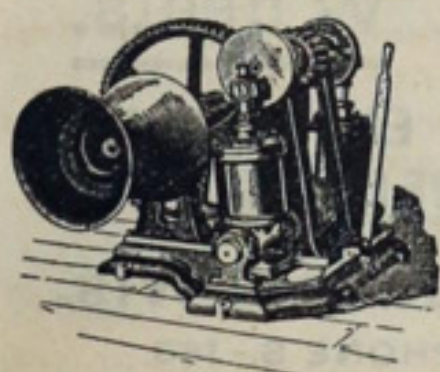
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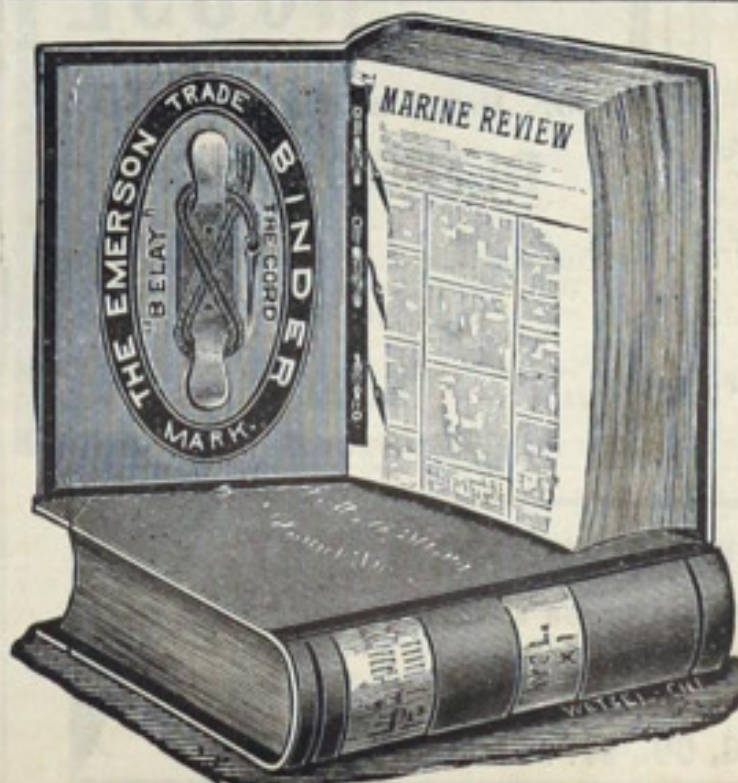
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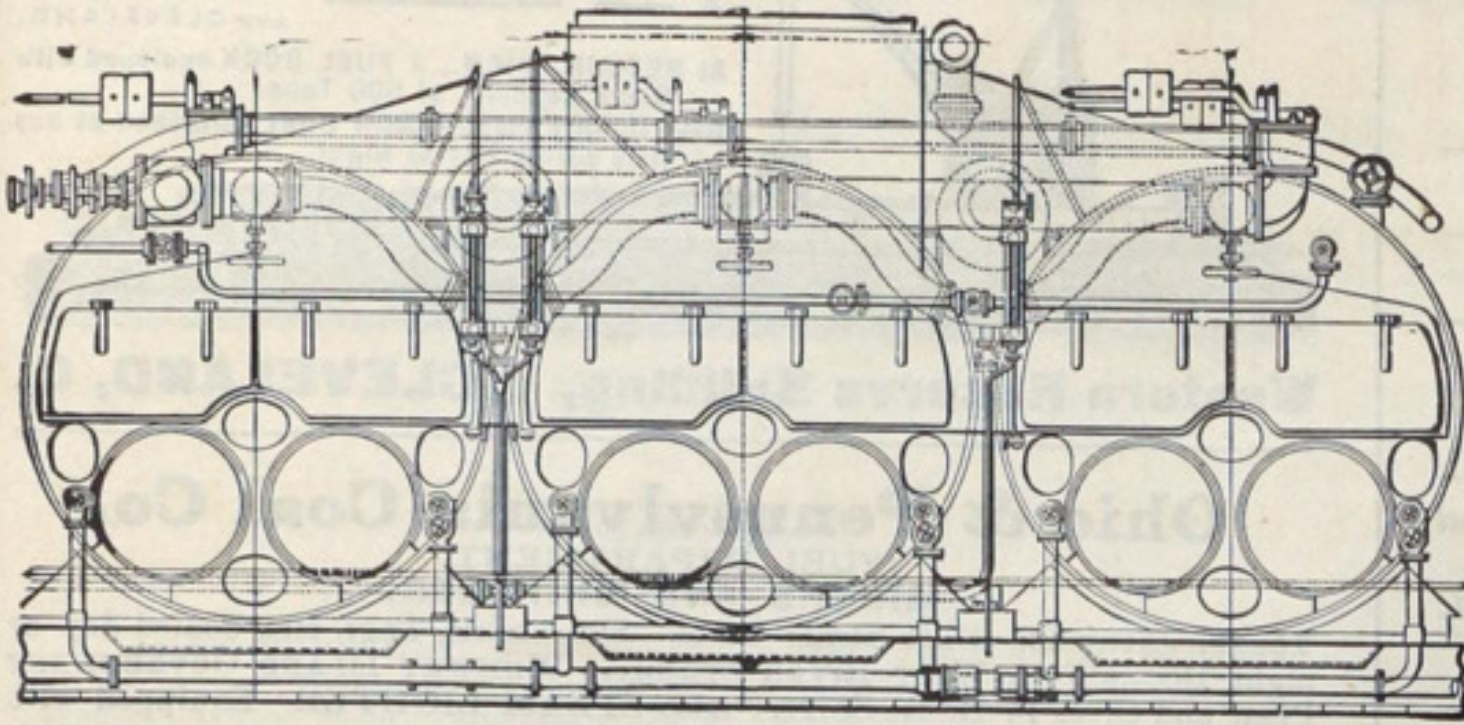
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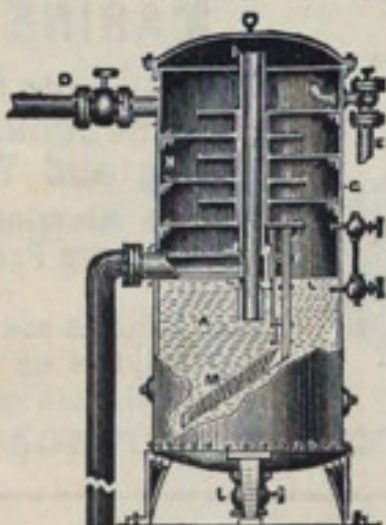
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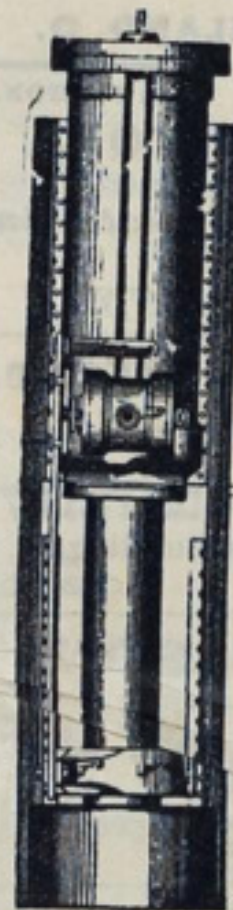


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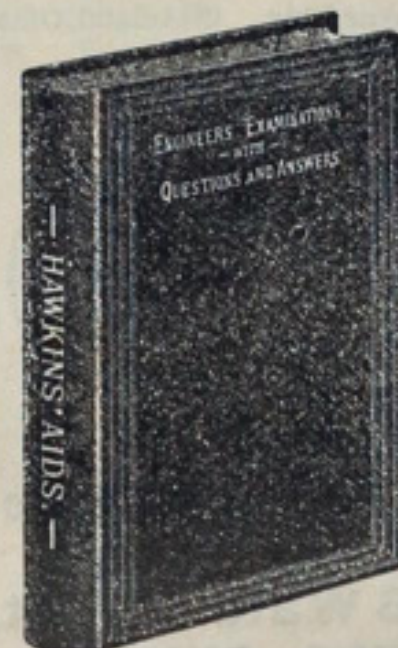
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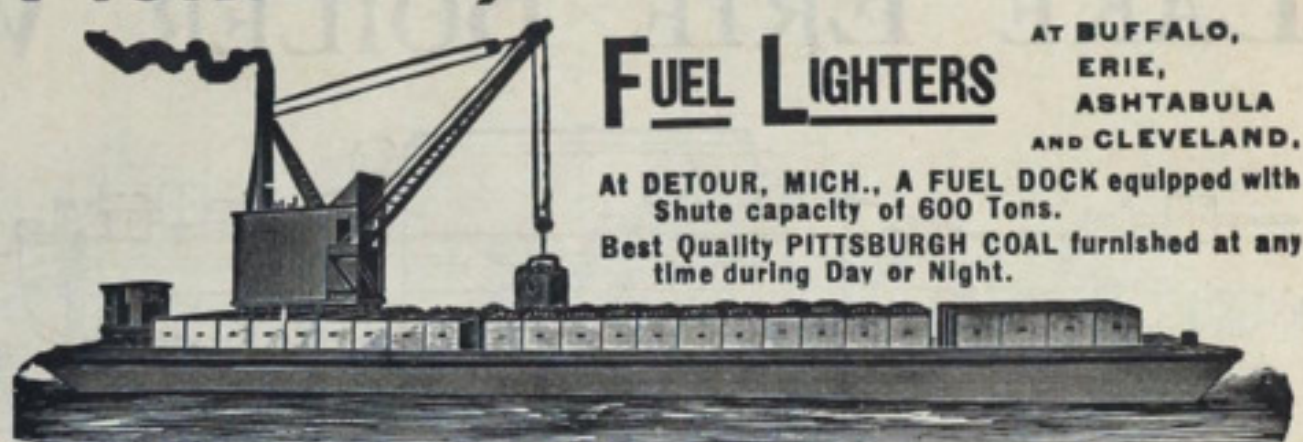
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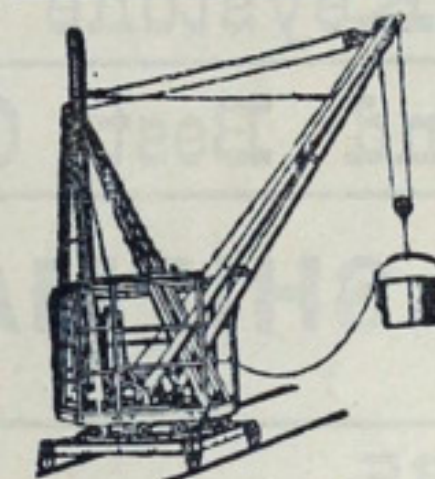
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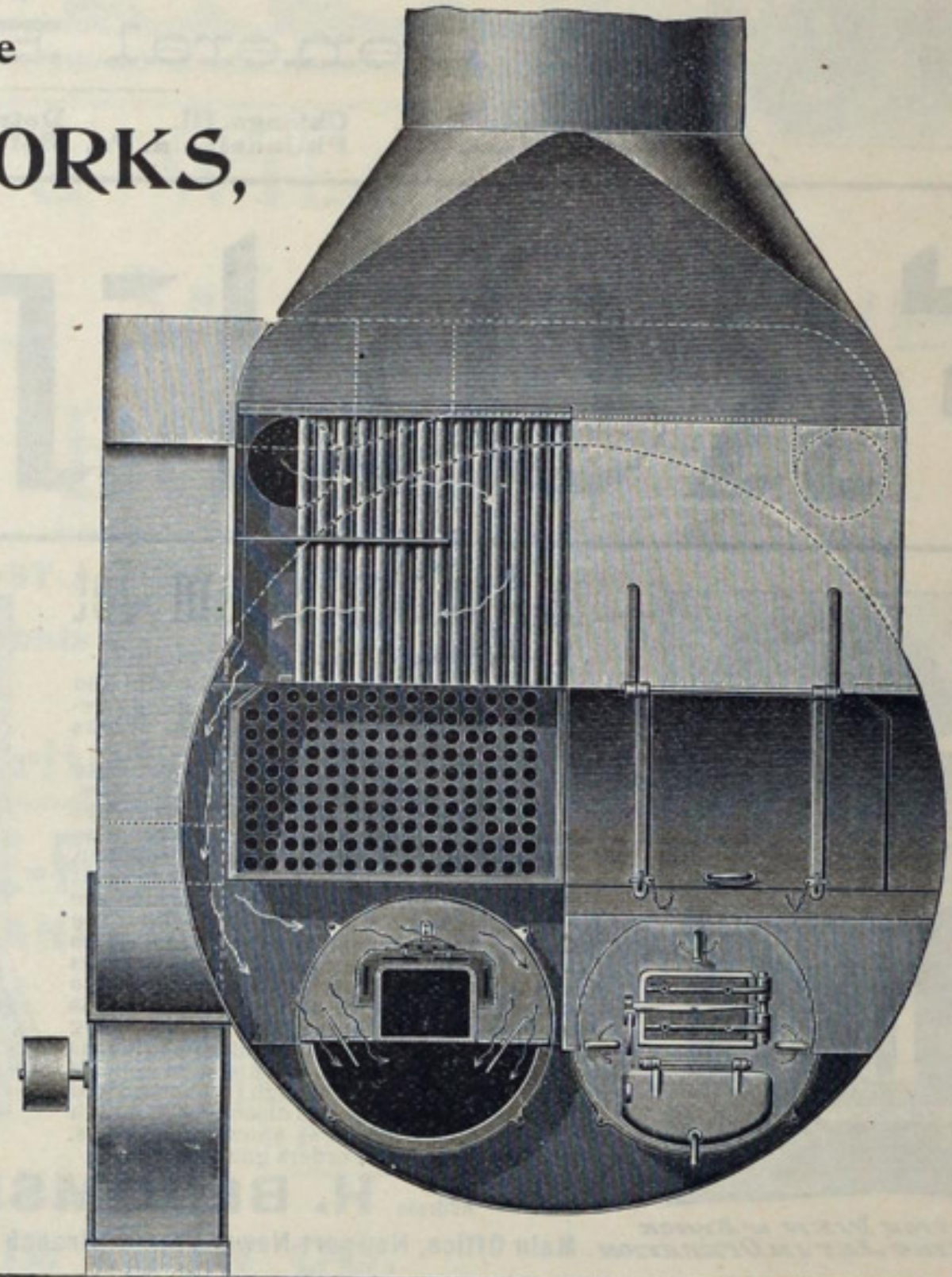
# HOWDEN HOT DRAFT SYSTEM . . . .

As Applied to Marine Boilers by the  
**DRY DOCK ENGINE WORKS,**  
 DETROIT, MICHIGAN.

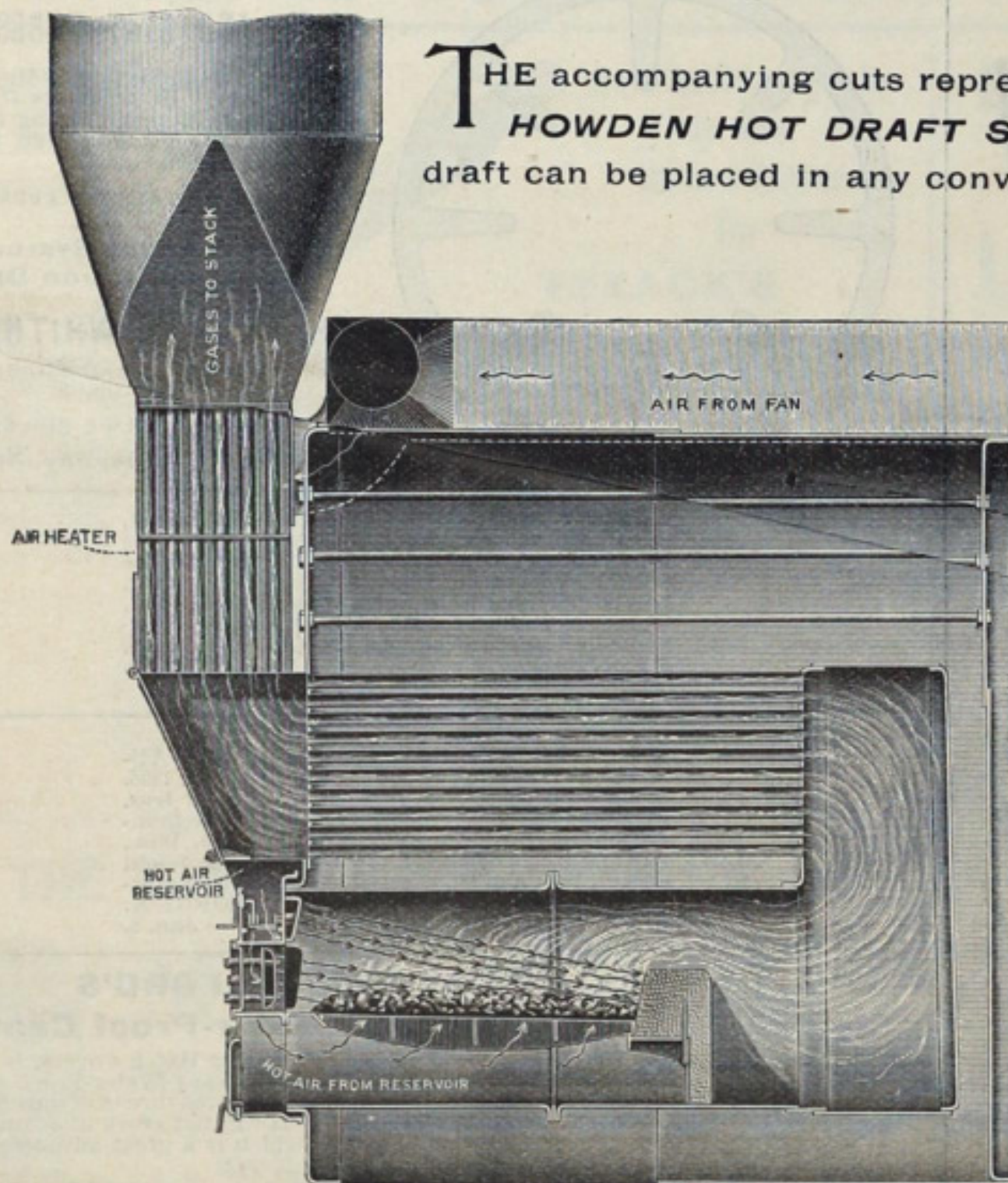
The following 35 steamers, aggregating 48,000 horse power, have been equipped with the Howden system by the Dry Dock Engine Works, Detroit, Mich.:

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The Howden system has a total installation in all parts of the world of 1,383,500 horse power.

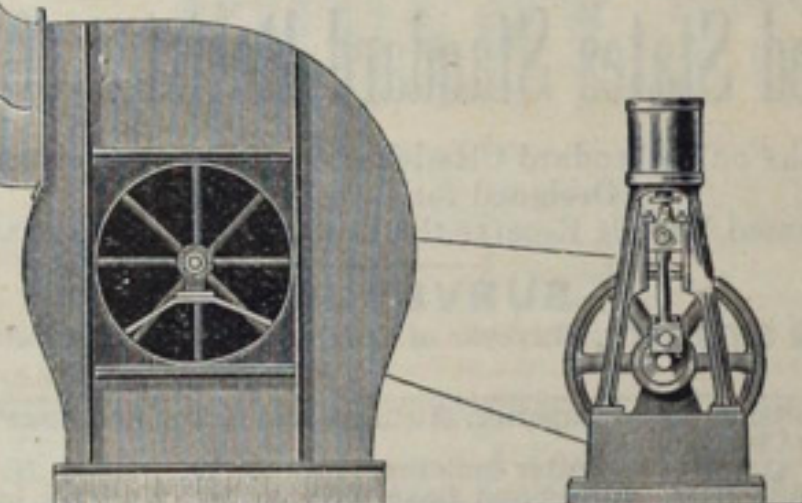


COVERING REMOVED—VIEW COMPLETE.

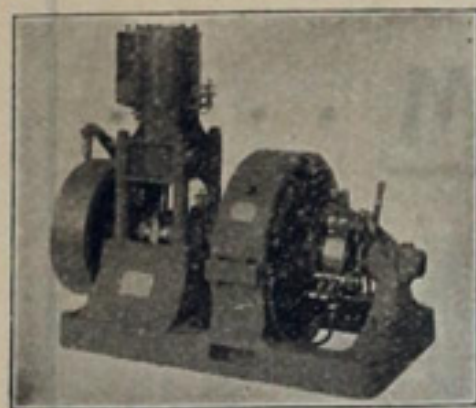


SECTIONAL VIEW.

THE accompanying cuts represent sections of a single boiler equipped with the **HOWDEN HOT DRAFT SYSTEM**. The engine and blower for supplying draft can be placed in any convenient place, preferably in the engine room. The hot air from engine room is taken in and forced through the air duct to air heater, where it is heated by passing among vertical tubes, through which the escaping gases from the boiler pass. The heated air is led down in ducts around breeching and delivered under and over grates in sufficient quantities to get perfect combustion. The arrows in accompanying views illustrate the passage of air from blower. This is in general the principle of the **HOWDEN SYSTEM**.







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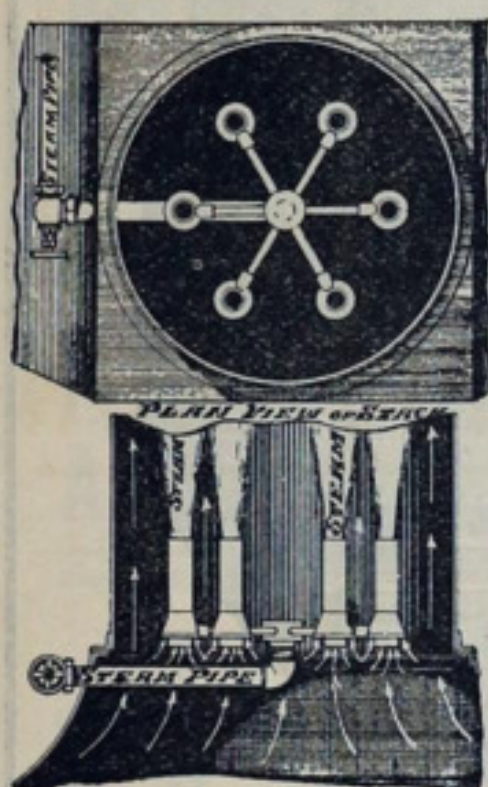
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SECTION VIEW OF STACK SHOWING SET IN OPERATION.

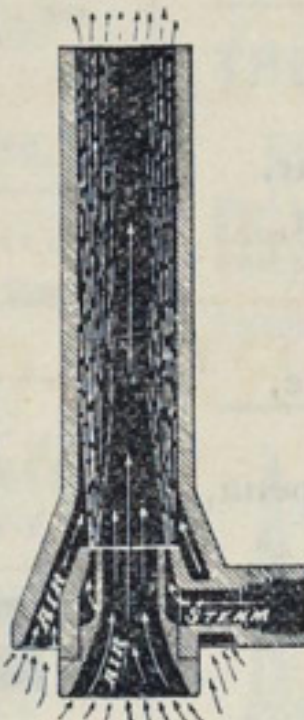
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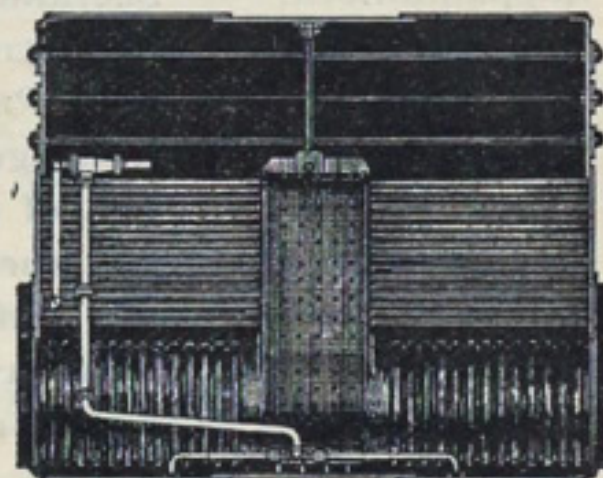
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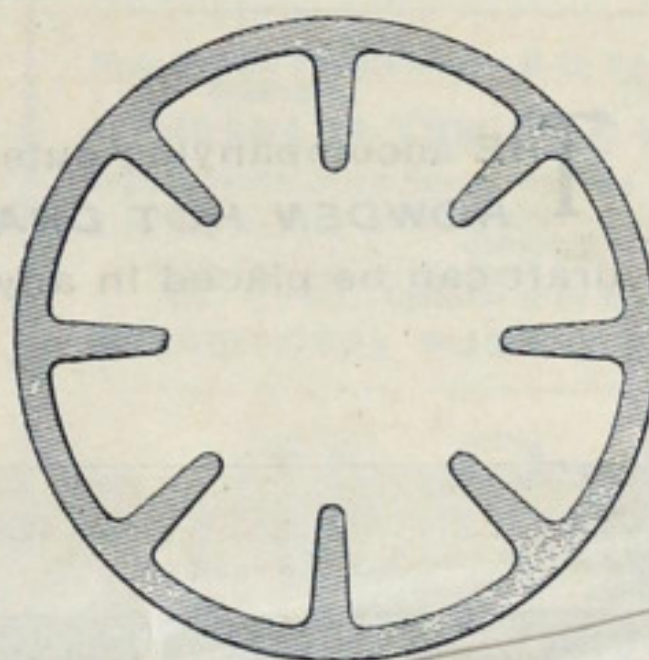
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U. S. ENGINEER OFFICE, DULUTH, Minn., Dec. 16, 1896. Sealed proposals for dredging about 21,000,000 cubic yards in the harbor of Duluth, Minn., and Superior, Wis., will be received here until noon, Feb. 15, 1897, and then publicly opened. Information furnished on application. CLINTON B. SEARS, Major, Engrs. Feb. 12.

U. S. ENGINEER OFFICE, 366 MILWAUKEE, St., Milwaukee, Wis., Dec. 17, 1896. Sealed proposals for 1,600 feet, more or less, of Breakwater extension, cribs on stone foundation, at Harbor of Refuge, Milwaukee, Wis., will be received here until 12 o'clock noon, Jan. 9, 1897, and then publicly opened. Information furnished on application. GEORGE A. ZINN, Capt., Engrs. Jan. 8.



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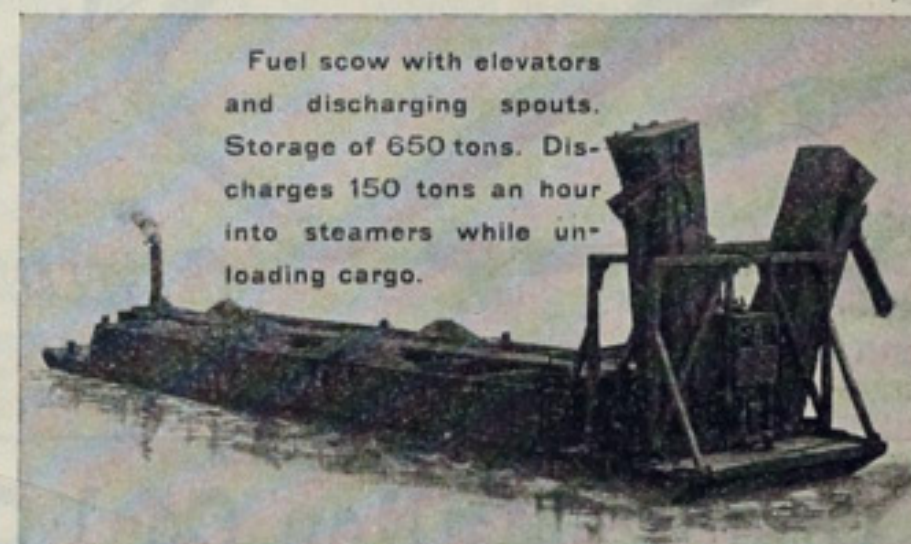
Over 40  
of these Anchors  
on Lake Vessels.

U. S. ENGINEER OFFICE, Duluth, Minn.,  
Dec. 14, 1896. Sealed prop. sals. in trip-  
licate, for building breakwater at Presque Isle  
Point, Marquette, Mich., will be received here  
until noon, Jan. 11, 1897, and then publicly  
opened. Information furnished on application.  
CLINTON B. SEARS, Major Engrs. Jan. 7,

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Fuel scow with elevators  
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Storage of 650 tons. Dis-  
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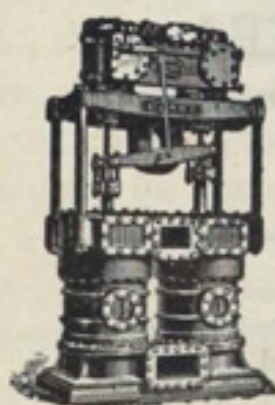
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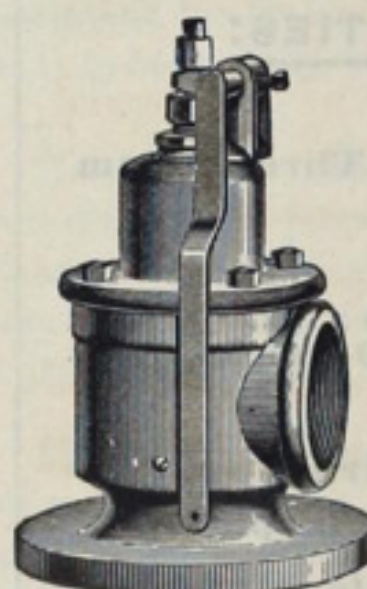
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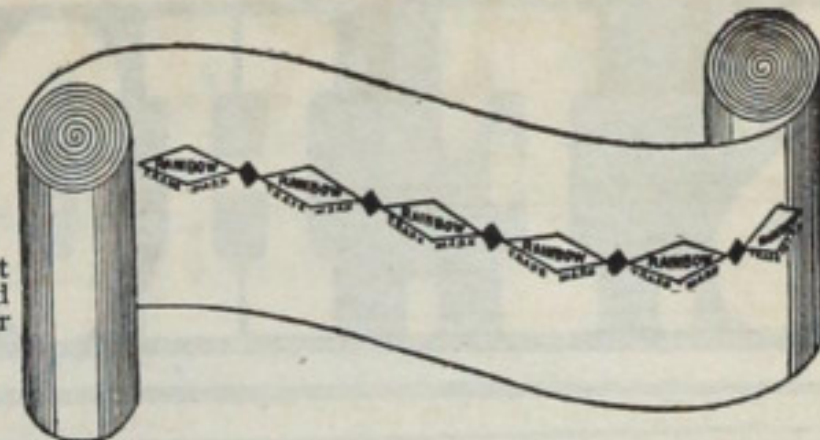
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New York City.

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### REPAIRING A SPECIALTY.

Dimensions of Dock:

Lth. over all, 360 ft.  
Lth. on blocks, 340 ft.  
Width of gate, 50 ft.  
Depth over sill, 20 ft.

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IRON OR STEEL FORGINGS FINISHED COMPLETE, ROUGH MACHINED OR SMOOTH FORGED ONLY, OF ANY WEIGHT.  
COUPLING LINKS AND PINS. PRESSED WROUGHT IRON TURNBUCKLES. CAR IRON SPECIALTIES.

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Car Dumper; Eight Pockets; Three Steam Derricks; Lighter.

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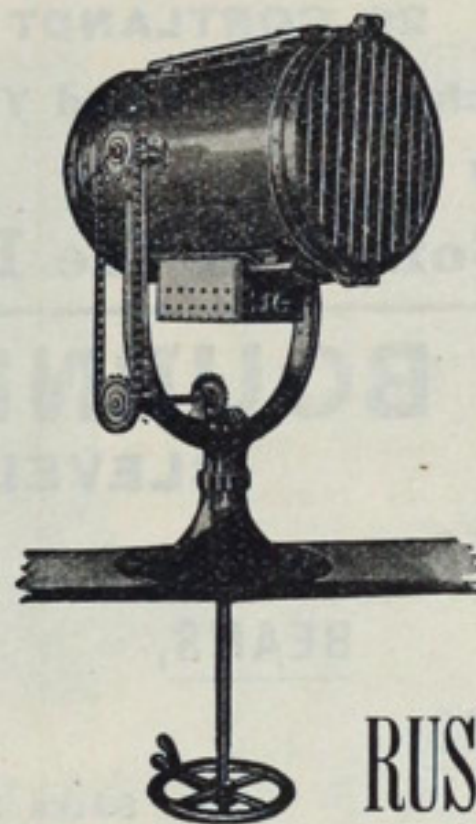
Amherstburg, Steam Derricks; Sandwich, Ten Pockets and Two Steam Derricks.

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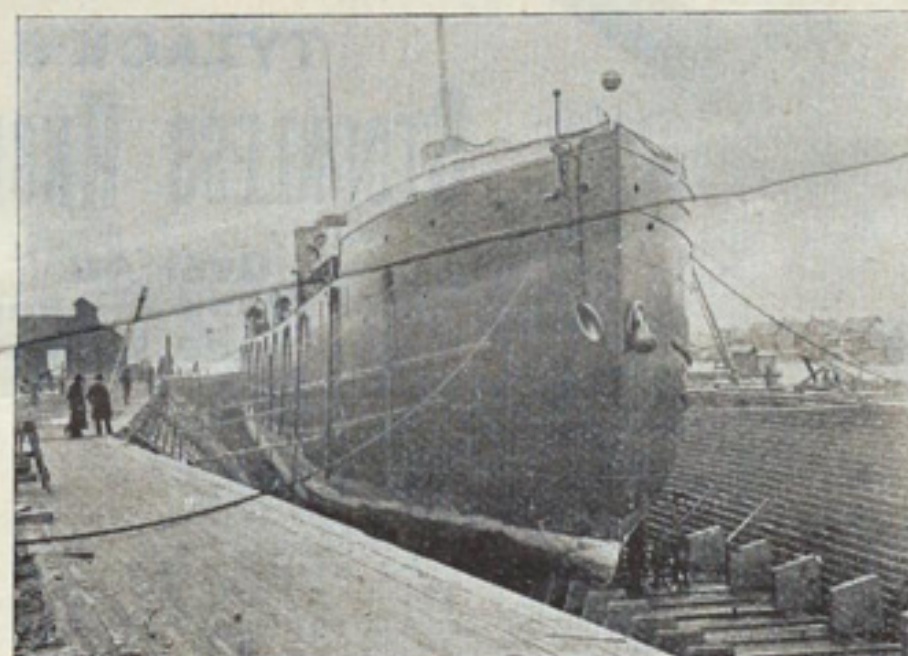
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Ships in  
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Quality  
of Oak  
instock  
for Re-  
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Wooden  
Vessels  
of all  
Classes.

### SIZE OF DOCK.

Length, extreme.....537 feet.	Entrance, Top.....55 feet 9 in.
Breadth, Top ..... 90 " 4 in.	Entrance, Bottom.....50 "
Breadth, Bottom ..... 52 "	Depth over Sills .....18 "

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Prices for Repairs and Docking same as at lower lake ports  
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A number of Propellor Wheels in stock at Dry Dock.

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The best thing of its kind as yet published, has recently been issued by the British admiralty, and may be had from the MARINE REVIEW, No. 409 Perry-Payne building. Another chart, of a very clear and interesting kind, taking in Lake Huron, Georgian Bay, Lake Erie and connecting channels has also been issued recently by the same authority.